THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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THE CAUSES OF THE MECHANICAL AND PHYSICAL PROPERTIES OF THE NON-FERROUS METALS.

By Ernest A. Lewis.*

ERNEST A. LEWIS.

What is the cause of the apparently remarkable properties of the non-ferrous metals? One can roll a piece of Muntz's metal at a red heat, yet if you try to roll ordinary 70/30† brass mixture hot it falls to pieces. One can make a Muntz's metal rod to give a tensile strength of 26 tons per square inch, slightly vary the mixture and add one per cent. manganese or iron and a very small percentage of aluminum (0.2 per cent.) and one can get a metal which gives a tensile strength of 35 to 42 tons per square inch.

One can take a piece of refined copper containing 0.2 per cent. oxygen, heat it nearly to whiteness and roll it at a nearly white heat with very little ill effect; if one takes an arsenical copper or a deoxidized phosphorical copper and treat it in the same way, it falls to pieces. Why do these things happen? To find the cause, one must examine the micro-structure and reduce it to a simple form and then the whole matter can readily be understood. The apparently remarkable failures of the non-ferrous metals can in nearly every case be accounted for. Some years ago Roberts-Austen introduced the Atomic Volume theory, "That the effect of impurities in pure metals is dependent upon the Atomic Volume." I do not think this law holds good.

The non-ferrous metals, which can be rolled, have, as a rule, two kinds of structure, they consist of one kind of constituent only, such as 70/30 brass, or a dual structure like Muntz's metal. It is sometimes stated that Muntz's metal is alloyed in atomic proportions and is a chemical compound. This is not the case, it not only contains two constituents, but every chemist knows that 62/38 brass mixture cannot be a chemical compound; if it did not contain two constituents it would not have the valuable properties it has.

A metal with a single structure has, as a rule, a greater elongation and less tensile strength than a dual structure under the same conditions. Make an alloy of 70/30 brass and 62/38 brass with the same metals, draw them down into thin rods and anneal them together, the 70/30 brass will have the lowest tensile strength and the greatest elongation. The 70/30 brass consists of a homogeneous structure, which is called "Alpha"; it is said to be a solid solution of zinc in copper; personally, I hold this view to be wrong; I consider it to be a solid solution of the compound Cu-Zn in copper. Cu-Zn would contain copper 49.14 per cent., zinc 50.86 per cent.

The chemical compound theory is substantiated in a remarkable way. The alloy of copper 51.0 per cent., zinc 49.0 per cent. has a beautiful crystaline structure which cannot be destroyed on heating and rapidly cooling by quenching in water. It has been shown that the crystals in the structure break up into smaller crystals of the same type. You cannot destroy them. In pure chemistry if you make a solution of copper sulphate in water and evaporate it to the crystallizing point and cool it slowly, it crystallizes in large crystals; if you cool it rapidly, it crystallizes in very small crystals, but they are exactly the same shape and composition as the large crystals. There are other physical reasons which point to Cu-Zn being a definite chemical compound. Professor Turner, in a recent paper read before the Institute of Metals on "The Volume Changes of Copper-Zinc Alloys,"‡ admits there is every probability of Cu_2-Zn_3 existing. The structure of this is very similar to that of Cu-Zn. It is urged against the existence of Cu-Zn that the alloy of definite structure is not quite in the atomic proportion, this is not surprising when the same metals have a decided tendency to form another compound when 10 per cent. more zinc is present.

STRUCTURE OF MUNTZ'S METAL.

Muntz's metal has a double structure; it is said to be "alpha" and "beta." I consider the "alpha" to be a solid solution of Cu-Zn in copper and the "beta" to be practically "Cu-Zn." If a rod of this metal is broken in a testing machine it will be found that the fracture takes place along the lines of the "beta" constituent. This constituent is the "strengthener" of the brass. The elongation of the "Cu-Zn in copper" or "alpha" is restrained by the "beta." In other words, the "beta" in the normal state is the strength of the commercial brasses containing from 57 to 63 per cent. of copper.

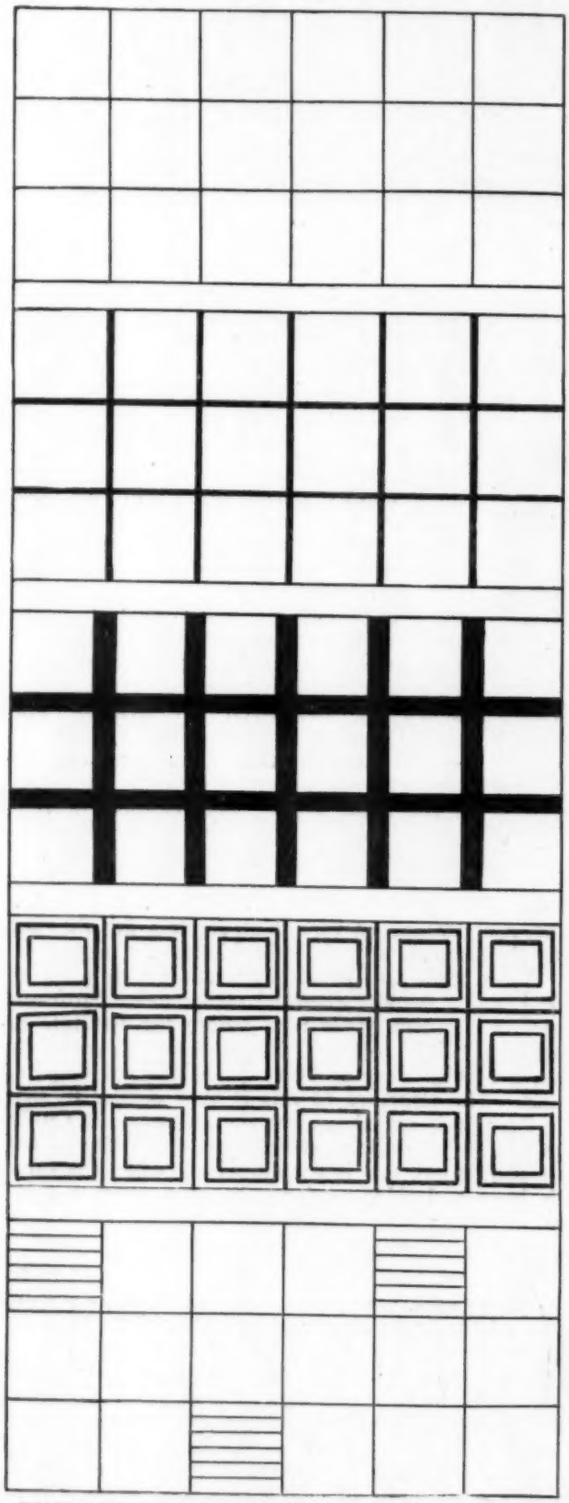
The proportion of "alpha" and "beta" varies on different heat treatment. The original work on this subject was done by the writer (Journal Society of Chemical Industry, Volume 22, Jan. 15, 1903), and more recently

*Metallurgist, Birmingham, England.

†Where this combination appears in text, it means copper and spelter mixture.

‡The Metal Industry, December, 1909.

it has been largely confirmed by other investigators. The "alpha" and "beta," whatever their composition, are only perfectly normal in the cast state.



DIAGRAMMATIC REPRESENTATION OF THE CRYSTALLIZATION OF ALLOYS.

NAVAL AND MANGANESE BRASSES AND BRONZES.

In naval brass containing copper 62 per cent., zinc 37 per cent., tin 1 per cent., the tin dissolves in the "beta" constituent. It not only hardens and strengthens the metal, but increases its corrosive resistance to sea water. If some of the copper is replaced by manganese or iron, we get the well-known managanese bronzes or Delta metal. Whichever metal is used, these metals are "toughenners" or "strengtheners" of the "beta" constituent, only they have the highest tensile strength of all the brass alloys. They are used extensively. Their structure is similar to Muntz's metal, but the "beta" constituent is greatly increased in bulk.

It may be asked why not make all brass of 50/50 mixture if it is the strength of the brass. But there is a practical limit. The nearer you get to 50/50 mixture, the greater is the hardness and brittleness, and the "alpha" constituent becomes so small as to have no effect and the elongation is greatly reduced.

It is easier for anyone who has not been trained as a chemist to understand the various properties of metals and alloys from the diagram I have drawn up. There have been many photomicrographs of metals and alloys published; but it is doubtful if they strike anyone but a chemist as to their connection with the properties of metals and alloys. I have assumed that all metals crystallize in the cubical system. This, of course, is not so, but it is the simplest way of looking at it.

A is a diagrammatic representation of a pure metal, or alloy of a solid solution of two metals, such as pure copper, pure gold or pure 70/30 brass. The crystals are close together, the dividing lines are fine and nothing surrounds them.

B is a diagrammatic representation of a pure metal or alloy containing a single impurity, which is insoluble in the crystals. The thicker boundary lines represent the impurity surrounding the crystals. Examples are bismuth in pure copper (free from oxygen and arsenic) and lead in pure 70/30 brass. As would be expected the bismuth being a brittle metal makes the copper very brittle and absolutely unworkable. The effect of lead on pure 70/30 brass is to make it unworkable at a red heat.

C is a diagrammatic representation of a metal containing two constituents. Examples are copper containing about 0.5 per cent. arsenic; this is of immense practical importance. The arsenide which is represented by the thick, heavy lines not only increases the tensile strength, but it dissolves any impurity which would weaken the metal and renders it harmless, such as bismuth and lead. This net work can easily be seen in microphotographs. It does not much weaken at temperatures of about 200 degs. Cent., hence, its value in locomotive fireboxes. In alloys this type of structure is represented by Muntz's metal, delta metal and the manganese bronzes. The white squares represent the "alpha" constituent and the black lines the "beta" constituent. There are relatively more of the black lines in Muntz's metal than in arsenical copper.

D is a diagrammatic representation of a pure metal or alloy which contains a true eutectic alloy. A eutectic alloy in a metal is that part which solidifies last in alternate layers of two pure metals, or a pure metal and a definite compound. Examples are lead-tin alloys also silver-copper alloys. The proportion of eutectic varies with the composition. If you melt an alloy of lead 70 per cent. and tin 30 per cent., the tin unites with a portion of the lead. As the mixture cools, the excess of lead solidifies and on the instant of solidification the lead-tin eutectic separates out in alternate layers of pure lead and pure tin. The lead-tin eutectic contains tin 68 per cent. and lead 32 per cent. The

silver-copper eutectic contains silver 72 per cent. and copper 28 per cent. Pearlite in steel is an example of a eutectic containing a pure metal and alloy in alternate plates. The pure metal is iron and the alloy iron carbide (Fe_3C).

In copper there is the eutectic alloy of copper oxide and copper, which exists in non-arsenical refined copper. This acts in the same way as the arsenide alloy. It renders small quantities of lead and bismuth harmless, but it is not so good as arsenic for this purpose. The more oxygen there is, the harder the copper. The presence of 0.3 per cent. oxygen in copper renders it unworkable in practice. It should be noticed that while copper oxide forms a true eutectic alloy with copper, the copper arsenide alloy, although similar, is not a true eutectic alloy.

E is a diagrammatic representation of an alloy containing a constituent which will not alloy with the bulk of the metal. The gun-metal bearing metals containing 15 per cent. to 30 per cent. lead is an example. The shaded portions represent the lead which does not alloy. Its only value is in its anti-friction properties. So far as strength is concerned, it is a source of weakness.

CONCLUSIONS DRAWN FROM THE DIAGRAMS.

From a careful examination of the diagram it will be fairly evident why metals have such remarkable properties. If we look at C the black lines are as explained above the "beta" of Muntz's metal; if we etch this alloy with diluted ammonia the "beta" is corroded away first. In actual practice chemically pure Muntz's metal would wear away rapidly, the zinc in the Cu-Zn or "beta" would dissolve out and leave copper, then the galvanic action of the copper in conjunction with the "alpha" constituent would begin and the metal would rapidly corrode away. Muntz's metal made from refined copper and ordinary spelter contains a small quantity of tin from 0.05 per cent. to 0.2 per cent., this dissolves in the "beta" constituent and it is not then so easily corroded, the action goes on slowly and the metal will last for years, provided no other cause of corrosion is present.

HARDNESS.

This is the power of resisting penetration. The hardness of metals and alloys is of two kinds, there is the relative hardness of the bulk and hardness of each constituent. In pure metals or alloys consisting of a solid solution of one metal or metallic compound in another, the relative hardness and the hardness of each constituent is the same thing, but dual constituent alloys like manganese bronze, leady gun-metal and many white metals have no real hardness. The relative hardness of the bulk is quite different to the hardness of each constituent. When comparing the hardness of alloys, this fact must be borne in mind.

ELECTRICAL CONDUCTIVITY.

When a current of electricity goes through a piece of chemically pure copper it goes from crystal to crystal without any interference; if we try to pass the same current through an arsenical copper it has got to get through the walls of arsenide which are poor conductors and much of it is lost in the attempt. In the same way with alloys, each constituent has a different electrical conductivity and the current is prevented from getting through. This property can be measured and is the electrical conductivity of the metal or alloy. Copper is usually taken as 100 per cent., but extra pure copper is nowadays often 102 per cent. Copper wire, for electrical purposes, must be free from any boundary walls of alloy or metals which would hinder the passage of the current, hence, all electrical copper is very pure.

I hope this diagrammatic explanation of the properties of metals and alloys may be of some assistance to those who are engaged in applying modern scientific research to practical works. So far as I know the diagramatic representation of the microscopic structure and physical properties has never been published before.

NEW METHOD OF TREATING IRON AND STEEL FOR TINNING.

It is well known that tinned or otherwise coated plates are very frequently imperfect by reason of the presence of minute uncovered areas, perforations, or so-called "pinholes" in the coating metal, such imperfections being highly detrimental by reason of the tendency of the coated metal to become corroded or pitted at these points or areas. While all surfaces of iron or steel which have been thoroughly cleaned and freed from grease or oxid are very susceptible to oxidation or corrosion, such imperfections are particularly liable to occur in plates which have been subjected to an acid pickling process; and their presence may in this case be partly or wholly attributed to the persistence in the metal to be coated of acid conditions arising from the baths employed for the removal of the scale.

In order to secure a more rapid and effective method of elimination of such acid conditions, and in general a more complete protection of coated surfaces from corrosive influences, a process has been patented by Henry Howard, Boston, Mass., United States. Specification 949,575 Feb. 15, 1910.

By means of this process the iron or steel articles are first freed from scale by the usual methods, as by immersion for a suitable time in an acid pickling bath. The articles are then immersed, after a brief washing or rinsing with water or a suitable alkaline solution, in an alkaline electrolyte, being connected therein as the cathode. As electrolytes, solutions containing a carbonate or hydroxid of an alkali are most suitable. An electric current is passed to the sheet or other article as cathode, resulting in the deposition or separation of the alkali metal, and by secondary reaction of this metal with the water of the solution, in an evolution of hydrogen at the surface of the metal. By this procedure the cleaned surfaces are rendered far less liable to corrosion, any residual acid conditions are quickly eliminated, and the metal may immediately receive a coating of tin or zinc by immersion in the molten metal in the usual way.

This metal differs from existing ones, where the electric current is employed for cleaning purposes by utilizing the evolved gases for the removal of scale, etc., in that the electrolytic treatment is applied to sheets or articles which have already undergone a cleaning operation, and which by reason of their freedom from scale or grease are highly susceptible to corrosion. The purpose of the treatment being to render the plates or articles less liable to subsequent pitting or corrosion and to secure in a rapid and certain manner the elimination of all residual acid conditions and the provision of a surface which is capable of receiving, by the usual coating methods, a more perfect film of coating metal.

THERMAL CONDUCTIVITY OF COPPER.

Rolled copper has a thermal conductivity 30 per cent. greater than electrolytically deposited copper, according to the Worcester Polytechnic Institute, Worcester, Mass.

COLONIAL VS. MODERN AMERICAN SILVERWARE.

By A. F. Saunders.*

"The hand of man, more perfect than any mechanism, is everywhere seen in early silversmiths' work. When, however, mechanical methods develop, their exactitude, their even precision and unintelligence replace little by little that fascination which belongs to everything shaped by hand. One need not therefore be surprised that there is so much difficulty in the silversmiths' art, no less than in other branches of industries, in procuring things today which have the charm of ancient work."

Violette le Due.

The recent exhibit of early American silver, held at the Metropolitan Museum of Art in New York City, aroused an unusual amount of interest in this class of metal work of the craftsman of Colonial times. It proved not only interesting but decidedly instructive to both the silver designer and craftsman of the present day. The great number and variety of pieces shown, representing the work of practically all the leading silversmiths of that early period, gave one a most comprehensive idea of the simple, clean cut workmanship of those art craftsmen.

FIG. 1. COLONIAL DESIGN BY PAUL REVERE.

Perhaps of greatest value to the modern student was his opportunity for comparison, coming fresh from his workshop to compare the results of his thoughts and advanced methods with those of over a century ago. He certainly could not help but be impressed with the strong adherence to true principles, the simple yet excellent craftsmanship displayed throughout the entire collection.

Considering the few simple tools used, the crude methods and the unsettled conditions of the times, these productions are of all the more value to us, as examples of both beauty and honest workmanship. In many respects our modern silversmithing compares most favorably with the old, even excels it in some ways. We are beginning to appreciate the value of simplicity, both in outline and decoration. Of course we are catering to the tastes of a vastly more cosmopolitan people than were these Colonials, and we incorporate more originality in design, as they, of course, naturally followed the prevailing styles of the mother country.

However, when we compare from a purely esthetic standpoint the difference in our methods of working, especially where machinery does a large part, we lose that true individuality so pronounced in their hand work. The danger common to a mechanical process is its suppression of the relationship which should constantly exist between the craftsmen and his material. The only method that renders adaptation entirely natural is that of a tool held in the hand throughout the entire execution from the form or outline to the finishing of its ornamentation; the constant contact and study required, counsels and teaches the craftsman at every turn.

FIG. 2. COLONIAL DESIGN ON MODERN LINES.

True beauty results from that repose which the mind feels when the eye, the intellect and the affections are satisfied. The only sound standard when considering design adapted to ornamentation is that which requires that the decoration shall increase the beauty of the object without limiting its usefulness, as the ornamentation of an article is something which is not always necessary to its use and is necessarily bad if it interferes with or limits use in any

*Designer Benedict Manufacturing Company, East Syracuse N. Y.

way. An excess of ornament adds nothing to the beauty of an object; it is rather an ostentatious vulgarity usually adopted to cover faulty construction. To a thorough understanding of these principles we can attribute the charm of true craftsmanship, whether it be of the seventeenth or the twentieth century.

Ornamentation was used very sparingly on all silver work made during the Colonial period; it was usually carried out in engraving, flat chasing or sometimes in repoussé, yet always in complete subordination to the chaste sweep of the outline. These methods of applications were most proper, as one of the most important principles of design is that all ornament should be worked out of the solid material, not added upon it. This cannot be said of much of our modern production; even in what we call high-class wares, machine-made stampings or castings are to an extent used. Better by far use some simple engraved, chased or hand-etched motif than the above, however elaborate and well executed they may be. Until we become educated to true appreciation of real handicraft work our efforts will lack that individualism present in the work of our Colonial ancestors and which is being sought for more and more every day.

The illustrations shown in this article give one an idea of the difference in style of design, Colonial and modern. No. 1 is a representative piece made by Paul Revere. No. 2 is a design based on modern lines. A few of our leading Colonial silversmiths were: John Hull, of Boston, 1683; Jerimiah Dummer, Boston, 1718; both the elder and younger Paul Revere, Boston, 1749-1799; John Hutton, Philadelphia, 1792; Peter Maverick, New York, 1811; Joseph Moulton, Newburyport, 1790.

SOME SIMPLE DIES FOR THE PRODUCTION OF BUCKLES AND FERRULES

By G. Sacerdote.*

Wire or sheet metal buckles and ferrules, and other articles of the same class, such as illustrated in the accompanying sketches, are usually formed either in two successive bending operations in two separate dies, or in one operation accomplished in two steps, viz.: First, forming of the bottom part; second, bending of the sides. If the work is produced in an automatic machine, this second operation is usually performed by cams, actuating two bending tools, while when the work is produced by means of a combination die, this second operation is performed by two side-acting tools, carried by two slides, and actioned by the punch. In this case all parts must be very accurately adjusted, so that when the punch is at the bottom of its stroke, the two slides are also at the end of theirs; this is not always feasible, and when it is, the proper adjustment and timing of the different

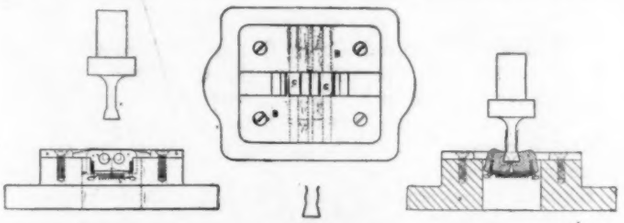


FIG. 1. DIE USED FOR MAKING ELECTRICAL CONNECTION CLIP.

parts must necessarily bring the cost of the tool to a high figure.

The tools described in this article are somewhat simpler both in construction and operation, and perform the whole operation in one step only; and the application made by the writer in several instances of the principle involved therein, give in actual work every satisfaction.

Fig. 1 shows a clip used in electrical connections, with a dovetailed shape. The die illustrated bends the clip first in a U form, and then gives the required inward inclination to the sides of the clip. The die is composed of a die bed, D, two bearings, BB, and two rotating parts, CC, kept in an upright position by the spring, S. Its action is self-explaining. The two rotating parts, CC, have an angular groove corresponding to the outside shape of the clip, and their axis of rotation passes through the center of the bend itself in the article to be formed; two sides of the grooves remaining vertical in the position of rest, as shown in the figures. A clip is put in its proper position, the punch, P, comes down, and begins to form the clip in a U shape between the two vertical sides of the grooves. When the bottom of the clip strikes the lower face of the grooves, it forces the two pieces, CC, to rotate around their axis, and to close on the punch, as shown in the sectioned elevation, therefore bending the two sides of the clip. In the return stroke of the

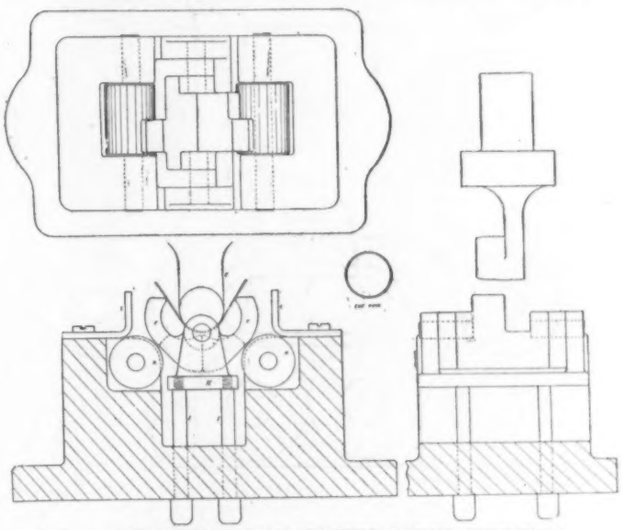


FIG. 2. DIE USED FOR PRODUCING ROUND FERRULES.

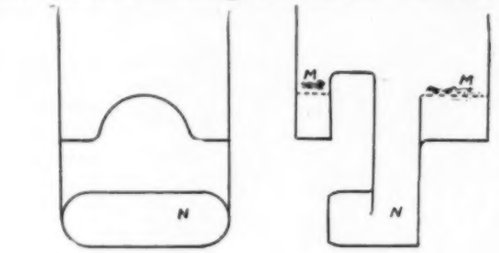
punch the parts, CC, assume their former position, and the finished article is carried up with the punch.

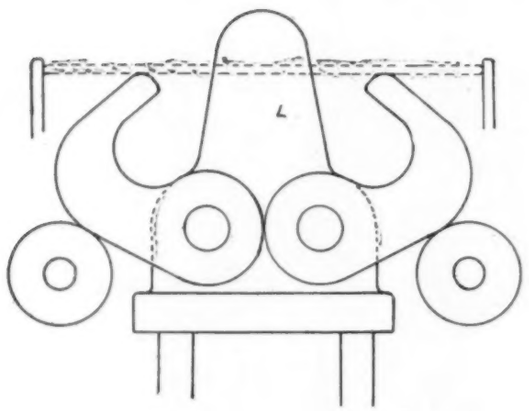
The die shown in Fig. 2 is designed to form a round ferrule, as shown, and is intended for use on a press having the spring attachment. The cut blank is placed between the two gauges, GG, resting on the upper flat part of two rotating jaws, FF. These rotate around a center, O, and are supported by a frame, H, provided with pins, II; these rest against the plate of the spring attachment of the press (not shown) and guide the frame, H, in its vertical motion. When the punch, E, comes down, the ferrule is first formed in a V shape between the two jaws, FF, but when the lower face of the jaws is reached the frame is forced downward,

*Mechanical Engineer, 441 West 21st St., New York.

compressing the attachment spring until the end of the stroke is reached.

In this downward stroke of the frame, H, and of the jaws, FF, these pass between two rollers, RR, whose action is to force the jaws to close upon the punch, therefore forming the ferrule. In the return





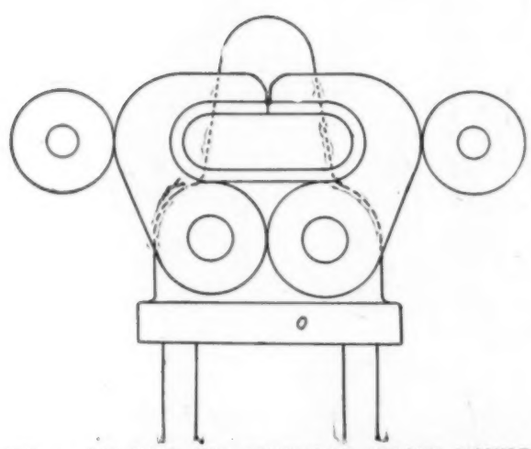


FIG. 3. DIE USED FOR PRODUCING OBLONG BUCKLE.

stroke each part assumes its former position, and the ferrule is carried with the punch.

The frame, H, is brought back to its position by the action of the spring attachment.

Practically the same principle is illustrated in the die, Fig. 3, forming the oblong buckle shown; the centers of rotation of the jaws must always be located in such a way as to permit the closing and the opening of it on the punch without forcing on the work. In this die the frame, O, is shown provided with one or two projections or noses, L, the punch having two corresponding recesses, MM. The faces of the recesses, MM, strike the projections, LL, at the proper moment, that is as soon as the buckle reaches the lower face of the jaws; this prevents the punch from flattening the wire against the jaws, the force necessary to contract the attachment spring being all exercised by the punch against the projections, LL. The two jaws can always return to their former position

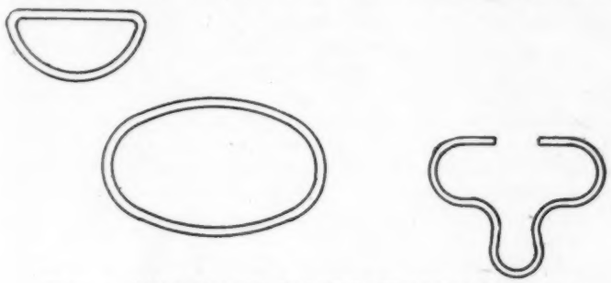


FIG. 4. SOME SHAPES CAPABLE OF BEING MADE BY SPECIAL DIES.

of rest with the aid of springs, not shown in the drawings.

The finished articles carried up with the punch are either extracted by hand or by means of knock-out devices which can be easily devised.

A few other shapes which can be obtained in a similar manner are shown in Fig. 4, but there obviously are hundreds of other different articles and shapes to which a principle similar to that described can be successfully applied. In fact this is not limited to dies of the type shown, but can be applied as well in automatic wire forming machines, and in can-body forming machines, simple in design and cheap to manufacture.

LATEST CUSTOMS RULINGS.

Flexible Copper Alloy Tubing Is Held Dutiable at 45 Per Cent.

The Board of United States General Appraisers has refused to reverse the action of the Collector of Customs at New York in his assessment of a 45 per cent. duty on merchandise returned by the appraiser as "flexible copper alloy tubing, copper being the component material of chief value."

Hensel, Bruckmann & Lorbacher, the importers, set up the contention that the articles should be assessed at specific rates either under Paragraph 176 as copper pipes or under Paragraph 152 as iron or steel tubes. Upon the hearing of the case the proof not only related to the copper alloy tubing, but was extended also so as to include certain flexible tubing made of steel and galvanized iron. The importers requested an analysis of the samples in evidence, with the result that the report of the chemist showed that the so-called tubing is in fact a tubing composed of phosphor bronze.

In overruling the protest General Appraiser Fischer comments on the importers' contention as follows:

"An article of that description is neither a copper pipe nor an iron or steel tube. We are not disposed to consider this protest as applicable to other than the tubing to which the Collector's attention was directed by the very wording of the protest—namely, 'copper tubing.' So far as the proof related to other goods covered by the shipment we hold the protest insufficient. The protest is overruled in all respects."

THE PRACTICAL ELECTRO-DEPOSITION OF GOLD

AN EXHAUSTIVE TREATISE ON THE SO-CALLED ROSE, ROMAN, GREEN GOLD AND SIAMESE FINISHES, TO BE CONTINUED FOR SEVERAL ISSUES.

(Continued from March.)

BY AUGUST HOFFMAN.*

THE FIRST STEPS OF THE ART OF ELECTRO GILDING AND COLORING.

Of course, the first thing necessary for making gold solutions is to bring gold to a soluble or liquid form, that is, to cut it down, which is done in the following manner: Take a casserole (porcelain dish) and clean thoroughly. Now, suppose we are to cut down ten penny weights of gold, which must be of 24 karat, and after clipping it into pieces as small as possible, place in the dish. Then take a graduate and measure out 3 ozs. of C. P. muriatic acid and to this add 1 oz. of C. P. nitric acid, which mixture is then immediately put into the dish and placed on the gas stove, using a small flame. As soon as the acid begins to boil, it is well to place the dish in a flue, as the fumes from this operation are very heavy and injurious. This process must be watched closely, and when the liquid assumes a deep orange hue, and has ceased to bubble, it shows that the gold has all been dissolved. Now add 8 ozs. of clean, cold water to the dissolved gold, after which add, very slowly, and a little at a time, 10 ozs. aqua ammonia, which forms a yellowish-brown precipatate, known as perchloride of gold.

This is allowed to stand about 12 hours, and is then filtered through unsized or white filter papers, which are placed in a glass funnel, held in a retort as shown in Fig. 5, as follows: After placing the paper into funnel, with a pan or bowl underneath, pour the contents of the dish containing the perchloride of gold into the filter paper, when it will be found that a clear, almost colorless, liquid will drop into the receptacle beneath, which is useless and can be thrown away, as the gold remains in the paper. Now wash the gold with clean, warm water, when the funnel runs dry and continue doing so until all trace of the ammonia is gone from the gold, which is ascertained by smelling the contents of funnel when the perchloride of gold after running almost dry is ready for use.

Now take the same dish used at first and put into it 3 pts. of clean water and ½ lb. of C. P. cyanide of potassium, which is slightly heated and allowed to dissolve. Then take the filter paper containing the perchloride of gold and place it into the warm cyanide water and allow all the perchloride of gold to dissolve until it becomes a clear liquid. This is now a "fine gold solution" which is the base for making of all gold solutions, and should be put into a bottle as stock solution.

Take another porcelain dish with 1 pint of clean cold water and take the filter paper out of first dish and put into clean water of second dish. Now squeeze out the paper thoroughly and throw paper away, as there is nothing more in it. Now take a clean ½-gallon bottle and pour the fine gold solution into the bottle, measuring the amount in a graduate first, also the water in dish No. 2, and then add clean water sufficient to make 30 ozs., which makes every 3 ozs. equivalent to one pennyweight of gold. Shake the bottle thoroughly, which is necessary every time some of this solution is used, so as to make it an even body.

This manner of preparing the gold for the making of the gold solutions, I have found to be the best method, as the gold can be accounted for to a pennyweight and the operator will be able to judge very closely the amount of gold deposited in the course of the day. It is advisable to say that this operation is very important and should be executed with extreme care, also not to spill or lose any of the solution in pouring and rinsing, as every drop of it contains gold after being diluted with the cyanide of potassium. Having brought the gold to this state, we are ready to prepare work for gilding and to make solutions for the different finishes.

HOW TO PREPARE AND CLEAN ARTICLES TO BE GILT AND COLORED.

The next step is the cleansing and preparing of the articles to be colored and gilt. All work should first be polished with tripoli to remove all deep marks and scratches on the plain parts of the article and washed in the regular ammonia wash water, after which it is dried in sawdust and taken to the sand blast machine. After setting the machine in operation, hold the article under the pipe so as to allow the sand to blow upon it until a dull matt surface appears all over the article or on the parts desired to be matt finished; for instance, if a ring is to be matted on the shank only, the thumb and forefinger are held over the other parts and the sand allowed to play on the shank only. If it should be matted all over, then sand blast one part after another, always moving the article until a dull, uniform matt appears on all parts.

The article is now ready to be cleansed for the gilding solution, and is done in the following manner: A clean piece of copper wire should be bent into a hook shape and the article hung onto it. Now immerse into the hot potash or lye solution for about thirty seconds, after which it is rinsed in cold water. Then proceed to the scratch brushes, and after immersing the article in the Panama soap bark solution it is scratch brushed with the two-row scratch brush, during which operation the article should be kept thoroughly wet all the time with the soap bark solution and kept moving in semi-circular motion until all parts have come in contact with the brush and appear as a dead lustrous surface.

Having our cleansed articles lying in a bowl of clean water and being now ready for the gilding bath, we will take up the formulas and making of the solutions, starting with the simplest of gold finishes—roman gold.

PRODUCING THE ROMAN GOLD FINISH.

It may be well to state that a porcelain dish is the best and safest thing to use in making solutions, also to work them in, though many gilders use ordinary agate pots or pans, but I have found that by using them great care must be taken, in case the enamel happens to chip, so as not to have the work suspended from the cathode come in contact with a bare spot, as this draws gold from the solution, but I will leave that to the discretion of the operator and in the following formulas and recipes will speak only of the porcelain dish.

*Foreman Plater J. K. Osborne Manufacturing Company, Harrison, N. J.

THE FINISHING SOLUTION.

The first solution to be made is called "the finishing solution," and is used in connection with both the roman and gold finishes. This solution is made to plate a clean, clear and filmless coat of pure yellow gold, and care must be taken to keep it chemically clean as well as free from dirt, and if distilled water can be obtained it is the best kind to use in making this solution.

To make this finishing solution take a thoroughly cleansed dish, into which put 3 pints of distilled water, place dish on stove and allow to boil; then add ½ ounce of C. P. cyanide of potassium, and when this has dissolved add 6 ounces of fine gold solution to the contents of dish. After this has been boiling for 2 minutes add 1 grain of C. P. ammonium chloride, Add sufficient water to make 1 quart. This completes the finishing solution, which can now be allowed to cool to 150 degs. Fahr., at which temperature it should always be when used.

THE ROMAN SOLUTION.

Our next solution is known as "the roman solution," and is made as follows: Three pints of clean water is brought to a boil in the porcelain dish, to which add 3 ounces C. P. cyanide of potassium, ½ stick of caustic potash and 1 grain of bisulphite of soda. When all is dissolved, add 9 ounces of the "fine gold solution" and sufficient water to make 1 quart. This solution should be used at about 160 degs. Fahr.

Now place a bowl of clean water before each solution, and as we have the necessary solutions in working condition, let us take our article and finish it in roman gold. Place it on the hook end of the wire used in the potash immersion and hold the wire firmly against the wire attached to the negative pole at the roman solution, as this is the first one used. Immerse the article into the bath with the left hand and take the positive pole into the right hand. Now place one-half of the anode into the solution and immediately, if the current is right, a fuzzing and bubbling of the solution will appear at and around the article, and after 2 or 3 seconds remove the anode and immediately place it into the bath on the opposite side of the article for 2 or 3 seconds; then back again; then over again; each time immersing the anode half for 2 or 3 seconds, and continue this operation for 3 or 4 minutes, which is sufficient for an ordinary deposit of gold for the roman finish.

The article is then rinsed in the bowl of water placed before the bath, taken to the scratch brush and brushed with the one-row brush all over, keeping the article thoroughly wet with the soap bark water and keeping it moving with a semi-circular motion as before. It is then rinsed in clean water and taken to the finishing solution, placed on a wire and connected as for roman gold and worked in the same manner, with about ½ to 1 second immersion of the anode on each side of the article, for ½ minute, moving the arms quite rapidly.

It may now be inspected, after rinsing in the clean water placed before the bath, and having followed all instructions carefully the finish should be perfect, after which it is rinsed in clean cold running water, then clean hot water, and placed into clean boxwood sawdust and dried, after which it will be found that the article has a deep yellow, lusterful "roman gold finish."

(To be continued.)

STREAKING OF COPPER DEPOSITED FROM AN ACID SOLUTION.*

By A. Tessler, Ph.D.†

Several months ago a sample of copper sulphate was delivered to me for analysis with the information that it was used in the plating department and had ben causing trouble. It was claimed by the platers that the sulphate was responsible for the streaking of articles plated in the solutions made from it. I made an analysis of this material and finding that it was a good, commercial grade I determined that the trouble must be due to the current. I conducted experiments with low voltages and low current, using the copper sulphate solution which was supposed to be inferior, and I found that the deposit appeared all right, but was not of the theoretical weight. As I had used platinum anodes the trouble could not be attributed to anode causes. Using the same solution and platinum anodes with the regular current, I obtained very poor results.

Thinking that possibly the fault in the solution may have been due to the water, I made tests with fresh copper sulphate in the same water as used in the original solution and also used the regular current. The results were most excellent. I then investigated the theory that the sulphuric acid caused the trouble, but found that such was not the case. During my experiments I observed that the side of the cathode opposing the anode got very rough and was covered with streaks and tree-like deposits and the deposit had the appearance of having slipped from the top to the bottom. I observed also that the side turned to the wall of the container was smooth. In order to make further check I placed a fine wire net on the cathode and proceeded to deposit the copper under the regular working conditions. The cathode deposit was excellent, but upon removing the net I found copper on the bottom.

From these experiments I decided that the solution in question was contaminated with something which, with ordinary current density, caused streaks, tree-like and pulverant deposits. I then felt certain that there must be organic material in the electrolyte. I took one gallon of this solution and placed in it some permanganate of potash to a slight excess and conducted experiments under the regular conditions. The results were excellent. The permanganate of potash destroyed the organic matter by oxidation without affecting the rest of the solution. The addition of alum in such a case was of no benefit. In order to check these results I experimented with c. p. copper sulphate, c. p. water and c. p. sulphuric acid, with additions of glue, gluten, etc. The results obtained from these various electrolytes were very poor and similar in appearance to those obtained in the plating room.

Experimenting further, I found that by adding tannic acid to these solutions, filtering the precipitates and using the regular current I obtained excellent results. I added tannic acid to the solutions used in the plating room and after filtering off the large precipitates‡ which fell conducted tests on a larger scale and obtained satisfactory results. The real cause of the trouble I found to be due to the fact that dextrine, which contains gluten, was used in the copper sulphate solutions. This commercial dextrine causes the acid copper sulphate solution to become collodial and gives the bad results described.

*Paper read at a meeting of National Electroplaters' Association.
†Chemist Edison Phonograph Company, West Orange, N. J.
‡Gluten tannate.

THE MANFACTURE OF WROUGHT BRASS.

A Description of Modern Methods for the Production of Plate, Sheet, Rod, Wire and Tube.

(Continued from March.)

By L. J. Krom.

EVOLUTION OF BRASS CASTING.

Twenty years ago the process of making brass was shrouded in mystery and in the hands of a few. To be a brass caster was considered a wonderful achievement and financial success was assured, for the money returns were large and out of all proportion to the work performed. Casters were considered wonderful beings and were regarded by the uninitiated with reverence tempered with awe. Some of the present-day large fortunes made in the brass business were based upon the earnings of an ancestor as a caster.

Casting in the olden days was done principally at night, ostensibly because the heat was too great to be borne in the day time, but in reality, to draw the veil of secrecy a little closer about the operations. Should an old-time caster be asked why he could not cast in the day time in winter when the weather was cold and the casting shop could be considered a comfortable spot, he would simply look "wise" and remark that "he always did cast at night and saw no reason to change!"

The old-time caster would weigh out a portion of his metal charges in the morning at the close of each day's work. The helpers would arrive at the shop around nine or ten o'clock in the evening, build the fires, put in the crucibles, fill them with metal, get the molds ready, and then sit down and await the arrival of the "boss," who would come rattling along in his "one-hoss shay" several hours later. Arrived at the shop he would finish the weighing of the charges, be very particular to "spelter" (put in the zinc) each pot himself (this was one of the secrets), and finally perform the operation "par excellence" of the casting industry, i. e., "pour the round." Four rounds of ten pots or crucibles each, making four to five thousand pounds, was considered a good day's work. Between rounds casters and helpers gathered together and ate their lunch, smoked their pipes and told stories of past and present experiences. Between the second and third round, usually about four o'clock in the morning, was the accepted time for "tea." This was the opening hour for the neighborhood "café," and in trooped the jolly crowd to get something to enable them to stand "fire" for the finish of a day's work. The work for the day was usually finished near to seven o'clock in the morning, and eight found the shop deserted.

THE COMING OF SYSTEM.

But times have changed, and so has the casting been systematized. In practically all brass producing mills of the present day, the shops are run on a systematic routine and the day's work begins nominally at seven in the morning and continues until four or five in the afternoon, when the shop is empty, unless being run on "double shift," when one set of casters follows another. The caster, who used to be the all-important being, has practically lost his identity, and simply does his share of the work as directed by the foreman of the shop, or in some cases by the chemist in charge.

All men of a "gang," three in number, start work at the same time. Upon the arrival of the "gang" at the shop, the fires are first kindled, the two helpers attending to this work while the caster weighs out his charges of metal according to a ticket furnished him, either by the chemical department, if there is one, or by the superintendent of the rolling mill. Some mills have a weighing department, where all the metal charges are weighed out and delivered to each caster. This simplifies the caster's work and leaves him free to attend strictly to melting and pouring. On the other hand this method relieves the caster of responsibility for mistakes in weighing, and therefore causes more or less friction between the two departments.

BUILDING THE FIRES.

In most casting shops of the present day hard coal is the fuel used for melting brass. Some shops use a mixture of coal and coke for building up a fire, but only in cases where quick melting is required. In building a fire, two large scoop-shovelfuls of coal are put on the bottom of the grate, then charcoal or wood chips are added and fired either with kerosene oil or a shovelful of wood ashes from an annealing furnace. After the fire has been well started the crucible, usually of a size shown in Fig. 1 capable of holding 200 pounds or

FIG. 1. TYPICAL NO. 70 CRUCIBLE FOR MELTING BRASS.

over, is placed in the furnace, a sheet iron cover with a long handle is rested on the top of the crucible and coal then shovelled in around it. The metal is then placed in the crucible and the cover of the furnace closed up.

MAKING THE MIXTURE.

If the round is to be all or practically all "new stock," the copper, in ingot form, is carefully placed, ingot by ingot, into the crucible, using a pair of long-handled tongs (see Fig. 2) for the purpose. Care is taken to leave considerable space between each ingot, so that they are not pocketed tight. The copper, when heated to a temperature close to its melting point, swells, and if the ingots are "wedged' the crucible will be broken. When the copper has begun to melt down, the furnace is opened and a shovelful of charcoal about chestnut size is put on in order to prevent undue oxidation of the copper, and further, to prevent contamination from the sulphur contained in the fuel, sometimes a handful

of coarse salt is introduced at this time, although it is entirely unnecessary, particularly with new stock.

"SPELTERING."

Fifteen or twenty minutes after the charcoal has been put on, the pot of metal is ready to be "speltered"; that is, the zinc required to make the desired brass mixture must be added.

The operation of "speltering" is one that must be conducted with considerable care. The metal into which it is proposed to introduce the spelter must not be too hot; on the other hand it must not be too cold. It is difficult to arbitrarily set down a heat limit on paper; each class of mixture has its limiting conditions which can best be determined by the pyrometer. Where spelter is to be added to pure copper, the copper should be what is known as **limpid,** but not pasty. The union of the spelter and copper is attended with evolution of heat, and the temperature rises rapidly, bringing the mixture to a thinly fluid condition. In speltering, the spelter in pieces weighing not over twenty pounds, are grasped in the jaws of a pair of "spelter tongs" (Fig. 2) and cautiously fed into the metal until it is all melted or absorbed. The operation is repeated

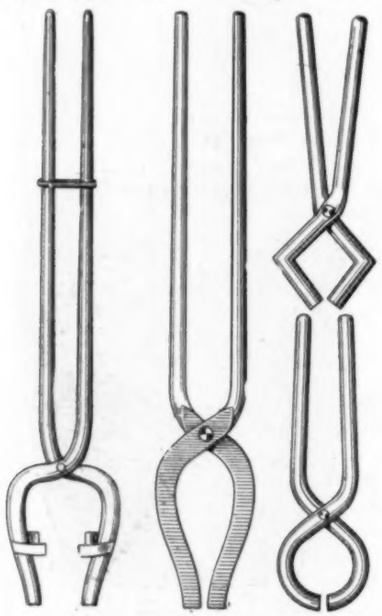


FIG. 2. CRUCIBLE TONGS. SPELTER TONGS. BANDING TONGS. METAL TONGS.

until the entire amount of spelter has been added. A handful of salt is thrown on top of the pot and the whole is vigorously stirred with a long iron bar having a ball or lump on one end, which will ensure an intimate mixture of the two metals.

If the mixture to be produced is the ordinary brass containing a considerable amount of scrap, the pot is sometimes filled with the scrap and the copper added after the scrap has melted. This is a rather wasteful practice, however, and the best method is to melt the copper first, add the spelter, and fill up with whatever scrap is necessary to fill the crucible and complete the mixture.

Of course, if an all-scrap mixture is being made, no alternative is offered but to melt the heaviest pieces first and then fill up with the lighter scrap.

The very light scrap, known as "clippings," which consist of odds and ends of rolled brass and the sheet brass scrap returned from "cutting up" shops, is first annealed in a muffle furnace to soften it, and then bundled up into what are called "cabbages" on a hydraulic press known as a "cabbage" machine. This forms the light, thin material into a compact mass weighing 40 to 50 pounds and just the right size to fit nicely into the crucible. By this means a considerable saving is effected by preventing "burning" and oxidation. A cabbaging machine is shown in Fig. 3. Such a machine can turn out 10,000 pounds of cabbage per day of ten hours at a labor cost of $3.50 to $4.

FLUXES.

While a number of compounds have been exploited from time to time for fluxing brass, the best materials

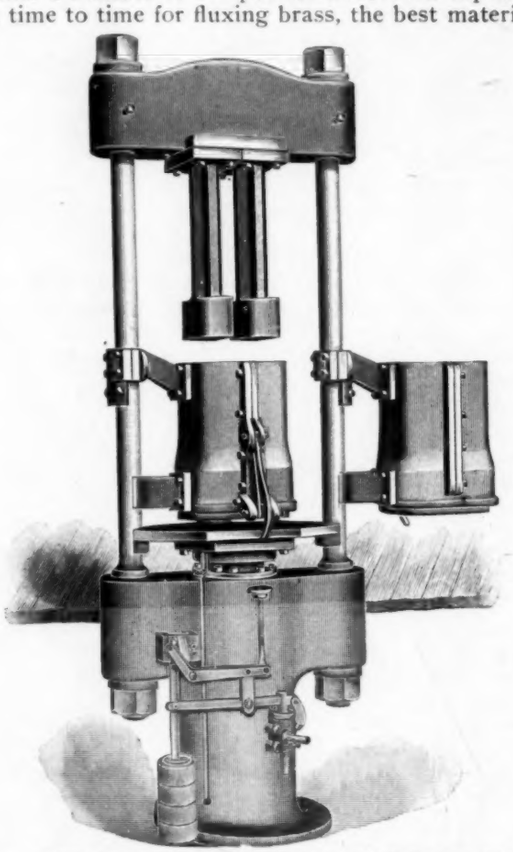


FIG. 3. CABBAGING MACHINE BUILT BY WATERBURY FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

that can be used for this purpose are charcoal and common or rock salt. The function of the charcoal is to supply carbon which combines with oxygen to form carbon monoxide and finally carbon dioxide gas, which acts as a protective coating over the melted metal, preventing the formation of injurious and wasteful oxides. The salt melts and forms a thin layer of a viscous nature which serves to collect the dross and dirt incidental to melting, and thus enables the caster to skim the top of the metal clean. For high melting point mixtures containing a large percentage of copper, such compounds as phosphor copper and tin, silicon copper and manganese copper are excellent materials for use in certain cases, determined by the nature of the mixture made.

Other fluxing materials are sodium carbonate, potassium nitrate, borax, flourspar, ammonium fluoride, and a large number of manufactured fluxes having the above materials as a base. In some special cases it is advantageous to use some of these compounds, but as a general rule they only serve to decrease the life

of the crucible by their corrosive action on its walls, and in the long run do not give any better results than charcoal and salt.

PREPARING THE MOLDS.

While the metal is melting in the crucibles the molds are made ready. This consists of first scraping them on the inside with a heavy iron scraper with a sharp edge. They are then oiled with either lard, whale oil or a mixture of both of these oils. A very good mixture for oiling molds and one that gives a body heavy enough to stand the pouring temperature, is composed of equal parts of lard and cottonseed oils. The object of oiling the molds is to prevent the hot metal from "burning in" and sticking to the iron surface of the mold. As soon as the oil is heated to its ignition point by the hot metal it takes fire and burns away imperfectly, leaving a thin film of carbon between the cast metal and the mold. Any oil, therefore, that has sufficient "fat," i. e., carbon bearing material, to give it lasting qualities, will make a good medium for coating the molds.

Among the various oils suitable for this purpose are lard, which is most commonly used; fish oils, including northern whale, porpoise, menhaden, and of the vegetable oils, cottonseed, when mixed with lard or fish oil. By using this latter mixture considerable saving can be effected in the use of oil, as cottonseed is considerably cheaper than either lard or fish oil. One of the objections to fish oil is the very objectionable odor, but this is of minor importance when the question of price is under consideration.

Mineral oils do not answer for this purpose as they contain no saponifiable matter, or fat, which is what gives the mold oil its chief virtue. One of the causes of a spongy or porous bottom end on a bar of cast brass is the fact that too much oil is put on the mold. If the mold is oiled from the top down there will be little or no draining at the bottom, but in a number of cases it will be found that the workman will oil his mold from the bottom up, and by the time he gets to the top of a 10-foot mold there will be a considerable puddle of oil at the bottom, which is lost sight of when the mold is closed. Then when the metal is poured in, the undue amount of oil causes a large evolution of gas which, caught by the chilled metal, is unable to escape, and spongy metal results.

In using molds that have never been poured into, it is advisable to have them annealed, that is to put backs and fronts together and leave in a muffle furnace over night with the bands on loose. When they are removed in the morning drive the wedges as tight as possible so that both parts of the mold will fit together. When cool coat with graphite in fine powder or china clay mixed with the oil. This gives a thin coat on the surface of the iron and prevents sticking of the brass. After a mold has been used a day or two, nothing but oil is necessary, for the residue of previous oils will be sufficient to fill the pores of the iron.

(To be continued.)

JUST A PICTURE.

By Joseph H. Hansjosten.

The following lines are not penned to offend any one, nor aimed at any one but that class of platers who, even today, I regret to say, consider it a crime to tell the "kid" that a dip or pickle contains acid and water. The picture is not that of any one plater I have known or know, but of a number of platers that I have worked under or met. I am simply drawing a pen picture of him or them, and believe he can be recognized by most platers, for most of them have met him somewhere—not always the same man, but always the same ideas, the same secretive methods, the old "fogy" way of doing things, or rather not doing things. If, perchance, any plater should recognize the picture as his, or if it resembles him, I hope he will not take offense, but will try to outgrow the resemblance. By getting out of the "rut" and joining that ever-increasing throng of modern, up-to-date and broadminded men who, by their writings and discussions in the trade papers and otherwise, are disseminating knowledge on plating which will raise the general standard of platers, to the great benefit, not only of platers themselves, but also of their employers.

It is many years ago that I first saw him, a man with an important and secretive air, always moving about the plating room with a copper dipper in one hand and a wooden paddle in the other, always stirring the contents of the dipper. At times he would disappear in a little room, partitioned from the plating room with boards. In the partition was a window and on the window in the little room was a curtain which effectually shut out a view of its interior. In the little room he mixed his solutions and he would bring out a dipperful at a time, pour it in one of the tanks, and tell me to show him some of the first work I would take out of that tank in the morning. When I brought it to him he would examine it critically and perhaps say, "Ah, I have her now," or wisely shake his head and remark, "I will have to doctor her up again tonight."

How we looked up to him and admired him! In our young minds he inspired a feeling akin to awe, and we wondered how much he had paid to learn to mix those mysterious fluids that worked such wonders with the iron we scrubbed and hanged in them. To our minds he was a master magician to whom the secrets of the black art were open as the day. What were the tricks of Hermann and Kellar to this man who, by means of his mysterious solutions was able to change iron into nickel and copper?

Sometimes one of us would be called into the "Holy of Holies," as some of the older "kids" called his little room, and told to carry from it a crock containing a black fluid with a gray scum and a smell like decayed eggs. We knew it was "oxidize" and worked wonders with copper-plated work, but what it was made of was his secret, and a carefully guarded secret, too.

He was always sure to erase the names of chemicals on packages containing them as soon as they came in, lest some one should learn what they were. He alone added more potash to that in the tank, and he would fill a pitcher with acid and then pour it in the pickle or dip tank himself.

How carefully he guarded his secrets! Had he not paid for his formula? Why should he give them to anyone? If anyone wanted to become a plater, let him pay to learn. That's the way he learned, and there were enough platers, anyway!

But he is nearly all gone now. Now and then you may still run into one, and he arouses a feeling of pity in you —pity for himself and for the firm that employs him. He is still keeping his "secrets," still going along as he did years ago, turning out as much work as he did years ago and, as a rule, getting as much pay as he did years ago.

THE GROWTH OF THE BRASS BUSINESS IN FOUR NAUGATUCK VALLEY TOWNS

ANSONIA, DERBY, SHELTON AND SEYMOUR.

BY WATERBURY.

In our two preceding articles we have tried to show how the development of the brass and copper industry in Connecticut, particularly in the Naugatuck valley, has followed the decline or change of location of the woolen mills which were the leading shops of earlier generations. In Waterbury, Torrington and Bridgeport the supremacy of the metal industries may be said to be unquestioned. but there is still some doubt of it in the lower Naugatuck valley towns. Ansonia, Derby, Shelton and Seymour have both metal shops and large cloth factories, and, except in Ansonia, one may be said to be as strongly entrenched as the other. There is a combination to be found, too, in the form of insulated wire production, and metal goods for corsets, but by far the more energetic industry is that of brass making and its eventual triumph over all the others in this center may be safely predicted.

Again the parentage of Waterbury is to be found predominant in the spirits which brought the brass industry into these towns. In our previous article on the towns outside of Waterbury, the name of Anson G. Phelps, pioneer brass and copper importer and merchant, of New York, was mentioned in connection with the development of the brass business in Torrington which is now in the hands of the Coe Brass Manufacturing Company.

It was as a result of a slight difference with his associates in the brass factory in Torrington, that Mr. Phelps undertook to make the goods independently in Derby as early as 1836. He built the first mill for rolling copper there in that year. Shipping had been Derby's chief activity up to the war of 1812, and as the Housatonic was then being navigated by boats from New York, this pioneer manufacturer undoubtedly hoped to solve one of the big problems—even to this day—of the new industry, namely, how to cut down freight bills.

Mr. Phelps was a good business man and he steered the new plant, run under the firm name of Smith & Phelps, throughout the panic of 1837 without loss. It was a success from the start. Men from England and the Torrington plant were secured to do the work, and as the colony of mill hands grew the industry spread.

In 1844, the decline of the brass kettle business, the mainstay of the Wolcottville (Torrington) Brass Company, fed Phelps's supply of men and he started a rolling mill up in Ansonia. This was a new town founded as a result of the speculative voracity of a Derby man who bought a farm in the section of Derby's outskirts that Mr. Phelps had proposed to turn into a new village and held it at a prohibitive figure until, in disgust, the promoters sought a new location and founded Ansonia, the town getting its name from Phelps's first name. Thereafter, Ansonia was his favored place and the new rolling mill was pushed to success, with the result that the Derby one declined and was abandoned in favor of Ansonia in 1854.

The Ansonia Brass & Copper Company organized for the production of metal goods in the new town and was given its earliest boom through the sudden development of the pin business. Dr. J. I. Howe, of New York, had invented a process of making pins by machine in 1831 and in 1841 he had perfected a solid head pin machine. This was a boon to the brass business in the lower valley, and when Dr. Howe and Slocum & Jillson, rival inventors, of Poughkeepsie, N. Y., got together and devised a process for sticking pins into paper by machine, the new industry began to make great inroads on this important branch of Britain's manufactures. The Howe Pin Company was organized in New York in 1835 and located in Derby under Phelps's influence in 1838. It had a long career there until purchased by the Plume & Atwood Manufacturing Company, of Waterbury, in 1908.

In 1842 the Brown & Elton Company, of Waterbury, bought out a pin shop at Northford conducted by the Fowler Brothers and also bought out a third interest in the Slocum & Jillson and Dr. Howe pin sticking machine patents. Pin making became such a thriving business that Brown & Elton and Benedict & Burnham interests organized the American Pin Company and located in Waterbury, and thereupon it was found that the pin industry was confined to the American Pin Company and the Howe Manufacturing Company. With English manufacturers still sticking their pins in paper by hand, American ingenuity was pushing its young industries to the world's markets with remarkable speed and success.

But the Phelps school was not to be allowed the giant's share at Ansonia always. In 1848 a sturdy wire drawer from England landed in Derby. He was Thomas Wallace and after drawing wire for a while for the Howe Manufacturing Company he set up in business for himself in Ansonia and his new company was incorporated in 1853. Wallace and Sons were soon known throughout the metal making world and had a successful career until about 1880. In 1896 the business was bought out by the Coe Brass Company, of Torrington, the successor to the old Wolcottville Brass Company and that's how the American Brass Company's hold was obtained in the Ansonia field.

Another plant had been started after the war by the Osborn & Cheeseman Company, including a rolling mill, wire drawing and finishing plant. This was set up in Ansonia and was an outgrowth of the hoop skirt fashion. It was employing as many as 250 hands in 1880, and seemed successful, but it went into the hands of a receiver in 1891 and its rolling and brass mill at Shelton were taken over by the Birmingham Brass Company, which had been organized in Derby in 1892. Coe Brass had decided to rule the section, however, and in 1903 the Derby plant of the Birmingham Brass Company was sold out to Coe Brass and soon after dismantled and removed to Ansonia.

The Ansonia Brass & Copper Company, the Coe Brass Company and the Farrel Foundry and Machine Company are now the leading corporations in this district. The Farrel company is the parent of the concern by the same name in Waterbury, and strangely enough Waterbury is the native city of its founder, Almon Farrel, who was one of the builders of Ansonia, Derby and Shelton. His son, Franklin F., born also in Waterbury, went to Derby on his father's contracts and was associated with him in the old Farrell & Johnson Foundry and Machine Company in 1849. Later this was reorganized and given its present name and Franklin F. Farrel was its president until his death, in 1857.

It was not until after the Housatonic River dam was completed, in the latter part of 1870, that Shelton stood in line for industrial development. Then the corset business was being boomed hereabouts and a corset factory was one of the first on the new Shelton canal which was completed about the same time the canal was built. The Derby Silver Company built a factory near that site, and

soon after there were other metal mills and shops constructed, including those of the Star Pin Company, about 1875, and the E. C. Maltby spoon shop, 1872, Sharon Bassett's bolt factory in 1872, and mills of other industries.

Seymour, which was originally Humphreysville, got its name from the governor, T. H. Seymour, by whose signature a bill making it a separate town became effective. It has been associated with the metal business most of its days and has the New Haven Copper Company and the Seymour Manufacturing Company as its leading industrial concerns.

Seymour offers more evidence of the steady progress in metal industry at the expense of cloth industry. The two have seldom remained long in the one place if both have striven for leadership. Brass insists on the front position. The only early mills at Seymour were the grain mills and the cloth mills of the Humphreys, who gave the town its first name. Later the manufacture of tools gained a foothold, and several small shops sprang into existence, but in 1849 the New Haven Copper Company's predecessor, the Humphreysville Copper Company, came in and began to lift its head prominently. It has continued to do so to this day, and under its present name, is one of the important concerns of the valley.

From the early half of the last century, when Charles Atwood began the manufacture of pens and German silverware in Derby, this community has had a name for pens. It is now the seat of one of the important factories of the Waterman company. Atwood was associated with the Colburns, who are mentioned above in connection with the Farrels, and added several articles to the list of small products in this section. Seymour as well as Derby has some of these small shops which turn out goods in use the world over but not known as Seymour products.

Today these four towns, on account of the big brass industries located in them and the smaller dependent shops or offshoots of the metal business, are to be reckoned with in the industrial wealth of the nation and hold no mean position. Ansonia may be said to be turning out nearly one-half of the output of the American Brass Company. A third more is estimated to be the product of the corporation's Waterbury plant and the rest is produced in Torrington. The Farrel company, with its magnificent plant, ranks high up in machine production. The Ansonia Brass & Copper Company is one of the great brass companies of the country and a fitting monument to the energetic work of the man who took his mill away from Derby and who wouldn't be satisfied with the smaller glory he enjoyed in connection with the Torrington people.

There are probably not half as many people in the four towns as Waterbury expects to be accredited with in the next census reports, but there are nearly 5,000 people engaged in metal goods manufacture. The population of the four towns combined in 1900 was about 25,000.

Following is a list of the principal concerns engaged in metal manufacturing, excepting iron, with their officers, average number of employees according to latest available statistics, approximate sum of payroll annually, and principal products:

ANSONIA BRASS & COPPER COMPANY, Ansonia; established 1854; capital, $1,500,000. President, A. A. Cowles, New York; vice-president, Charles F. Brooker, Ansonia; treasurer, Russell A. Cowles; secretary, Charles A. Cowles; general superintendent, W. A. Cowles; 1,600 employees; annual payroll approximately $1,200,000. Brass and copper goods in all varieties.

ANSONIA NOVELTY COMPANY, Ansonia; established 1899. President and treasurer, Theodore Bristol; secretary, A. H. Bartholomew; 100 employees. Clocks, shears, thimbles and metal novelties.

COE BRASS MANUFACTURING COMPANY, Ansonia; (officers published last month*); about 1,200 employees; annual payroll approximately $950,000.

H. C. COOK COMPANY, Ansonia; incorporated 1902; capital, $12,000. President, Henry C. Cook; treasurer, Lewis I. Cook; secretary, Chapel S. Carter. Nail clippers and metal novelties.

FARREL FOUNDRY & MACHINE COMPANY, Ansonia; established 1858; capital, $1,150,000. President, Franklin Farrel; secretary, Frank E. Hoadley; treasurer, Charles F. Bliss; assistant secretary, Alton Farrel; assistant treasurer, Franklin Farrel, Jr.; 800 to 1,000 employees; annual payroll approximately $750,000.

JOHN B. GARDNER'S SONS, Ansonia; established 1857. G. Sturgis and Louis F. Gardner; 100 hands. Clock trimmings, brass plating and finishing.

SILVER PLATE CUTLERY COMPANY, Ansonia; established 1883; capital, $100,000. President and treasurer, J. R. Brinsmade; secretary, J. B. Brinsmade; vice-president, Smith Abbott; directors, officers and D. S. Brinsmade. Silverware and table cutlery.

F. L. GAYLORD COMPANY, Ansonia; incorporated 1893; capital, $15,000. President, Max Olderman; secretary, William Olderman; treasurer, A. Novitsky. Brass casting and finishing, automobile parts, bathroom fixtures.

MEYERS IRON AND BRASS FOUNDRY, Shelton; established 1897. Frederick C. Meyer and Frederick S. Meyer. Brass specialties.

DERBY SILVER COMPANY, Shelton; (part of International Silver Company); established 1872; merged with International 1898. Superintendent, Thomas H. Newcomb; sales manager, Wesley H. Clark; 460 employees; annual payroll approximately $300,000. Silver cutlery and table ware.

STERLING PIN COMPANY, Derby; established 1899. President, John Peterson; treasurer, Franklin S. Slauter; secretary and superintendent, Irving H. Peck; 100 employees. Hooks, eyes, hairpins.

F. KELLY COMPANY, Derby; established 1892; capital, $50,000. President, Fergus Kelly; secretary, I. F. Baldwin; treasurer, Miss Frances E. Osborne. Wire and sheet metal goods.

UNION FABRIC COMPANY, Derby; established 1887. President, Frederick W. Holden; secretary and treasurer, S. N. Blum, New York; assistant treasurer, Miss Frances E. Osborne; assistant secretary, Albert E. Gray. Covered wire for corsets and corset specialties.

ROBERT N. BASSETT COMPANY, Shelton; founded 1836; incorporated 1895; capital, $400,000. President and treasurer, F. A. Russ; vice-president and assistant treasurer, S. J. Leonard; 800 factory hands and 1,000 to 2,000 piece workers at homes; annual payroll approximately $400,000. Covered wires for corsets, clasps, hose supporters, eyelets, etc.

WHITCOMB METALLIC BEDSTEAD COMPANY, Shelton; established 1890; incorporated 1891. President, Walter O. Whitcomb; secretary and treasurer, Edward M. Oldham; 150 employees. Metallic bedsteads, springs, etc.

SEYMOUR MANUFACTURING COMPANY, Seymour; organized 1878; incorporated 1880; capital, $500,000. President, Charles A. Pine, Ansonia; secretary and treasurer, William H. Wooster; assistant treasurer, George E. Mathies; assistant secretary, F. G. Boeker; 350 employees; annual payroll approximately $200,000. Sheet metal, wire, rods, tubing in German silver, copper, brass and bronze.

NEW HAVEN COPPER COMPANY, Seymour; established 1848; capital, $200,000. President, Thomas L. James, Ansonia; treasurer, F. A. Rugg; secretary, H. S. Richards; 125 employees; annual payroll approximately $100,000. Braziers' sheets, copper sheets for boilers, extinguishers, etc.

H. A. MATHEW MANUFACTURING COMPANY, Seymour; established 1890; capital, $125,000. President, Franklin Farrel; vice-president, Edmund Day; secretary and treasurer, George E. Mathies; superintendent, R. G. Cornforth. Sheet metal specialties.

*THE METAL INDUSTRY, March, 1910.

CORRECTION.

Through a misunderstanding it was stated in the March number of THE METAL INDUSTRY that the Bridgeport Crucible Company was affiliated with the Dixon Works of Jersey City. This is not correct. The Bridgeport Crucible Company is affiliated with the Taunton Crucible Company, of Taunton, Mass.

NEW DETROIT FOUNDRY OF THE ALUMINUM CASTINGS COMPANY.

AN ADAPTATION OF THE UNIT IDEA FOR FOUNDRY CONSTRUCTION.

The new foundry fast being completed in Detroit by The Aluminum Castings Company of Cleveland, Ohio, will be the largest, best equipped and most up-to-date foundry in the world. By referring to the cut here shown it will be seen that the plant is laid out on the unit system, each unit being a complete foundry in itself, with its own melting and core room. Each foundry unit is 60 by 150 feet, with a core room 60 by 70 feet. Dividing the core room and foundry is a 20-ft. passageway running the entire length of the plant and forming the intercourse between the different departments. Each unit has its own lunch, coat and wash room, located in an enclosed balcony above the core room. This balcony is 20 feet wide and partitioned every 60 feet, making each lunch room 20 by 60 feet. These lunch rooms, which are well lighted and ventilated, are reached by a stairway opening from the main passageway.

The plan is to classify the work so that castings of a similar character will be made in the same unit. The unit plan also keeps the men in each unit entirely separate from the men in the other units and this enables the company to divide the work into different classes. As the molders in each unit will work constantly on a certain type of casting, they will become more expert in turning out a certain class of work and better results in both quality and cost will be obtained.

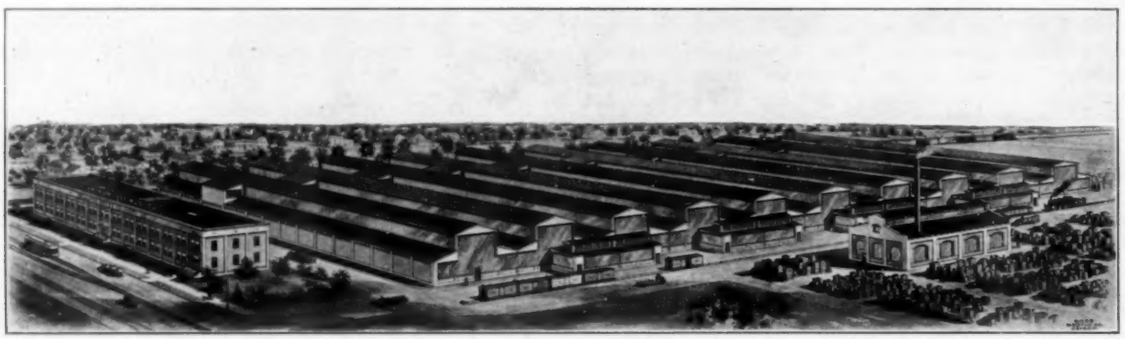
Each unit will have its own foreman, who will not have so many men working under him but that he can keep in the closest touch with the quality and quantity of their production and can keep himself thoroughly familiar with the details of the work under his control. Naturally, there will be some rivalry among the foremen of the different units, and the company intend to encourage them to take pride in the showing their unit can make in the way of cost and quality of castings produced.

In the manufacture of aluminum, brass and bronze castings, especially in jobbing foundries, it has been found that the best results have been obtained in comparatively small foundries employing from twenty-five to thirty molders, and in following the present plan the aim has been to take advantage of this fact. The units are large enough to operate with the greatest economy and are equipped with every possible labor-saving device for turning out castings of the highest quality at the lowest possible cost. This plan also makes it possible to expand the plant almost indefinitely without interfering with the original plan in any way.

There is a railroad siding on each side of the building, so that incoming and outgoing shipments can be handled with the least possible labor. An electric trolley system has been installed throughout the plants so that materials can be transported from one department to another with little delay and expense. Each unit is also provided with two thirty-foot electric cranes.

The buildings are absolutely fireproof, the walls being of brick and steel, the roof of concrete. Not a piece of wood has been used in the construction; even the window sash are of steel. The monitors in the roof have 10½ feet of glass, giving an abundance of light, without even the additional light provided at the ends of each unit. The plant is located on a site consisting of twenty-six acres of land which allows of ample room for future growth. The dimensions of the various buildings are: Office, 160 by 50 feet; foundry, 600 by 265 feet, and power house, 48 by 80 feet.

The Aluminum Castings Company as it was described in THE METAL INDUSTRY for January, 1910, is the consolidation of a number of the largest foundry companies of the United States. The company was formed in September, 1909, with a capital of $800,000 and has foundries in operation in Cleveland, Detroit, Buffalo, Syracuse, New Kensington, Pa., and Bridgeport, Conn.



THE DETROIT PLANT OF THE ALUMINUM CASTINGS COMPANY—THE LARGEST FOUNDRY IN THE WORLD.

The officers of this corporation are Edmund E. Allyne, president; W. P. King, vice-president; F. C. Root, treasurer; G. C. Ford, secretary, and Charles B. Bohn, general manager.

USES OF WHALE OIL SOAP.

Whale oil soap has been in use for many years in the Eastern States as a medium in reducing buff and polishing dirt from all metals. This is accomplished by using about ½ pound of the soap to the gallon of water; this is heated up to the boiling point and maintained at that temperature while cleansing the articles. By its use washing in benzine is eliminated; it does not affect the color of the polished surface. After the articles have been allowed to boil for 10 or 15 minutes they are removed, washed well in cold water, passed through a dilute cyanide of potassium solution, rewashed and dried out by the aid of boiling water and then with maple sawdust—this is for lacquering. For plating, the articles can be wired up or framed up directly after washing from the soap bath. Of course, the usual immersion in the regular cleaning baths for a few seconds is necessary on account of the very slight greasy film on the articles after boiling, although this is not perceptible to the eye. Many novelty concerns will use no other method, especially as manufacture buckles in endless variety. CHAS H. PROCTOR.

FOURTEENTH ANNUAL CONVENTION OF FOUNDRYMEN AND MANUFACTURERS AT DETROIT, MICH.

REPORT OF THE PROGRESS OF THE LOCAL COMMITTEES.

BY OUR DETROIT CORRESPONDENT.

The local committee having in charge preparations for the coming convention of the Allied Foundry Associations, which opens in Detroit on June 6 and continues until June 10, have arrangements far advanced and every assurance is promised that this gathering will be the greatest of the kind ever held. The ladies, who always take a prominent part in these conventions, will be amply provided with amusements. A committee has arranged for an automobile trip around the city and a theater party on June 7.

A smoker will be given at the Light Guard Armory, on Tuesday evening, June 7. Chairman Woodison has some original features to "pull off" and those who recall his previous efforts along this line will realize that a treat is in store for them. The ladies will be at the theater party that night, and as the theater is located near the hotels, no one need leave early to call for his companion.

Arthur T. Waterfall, president of the American Foundrymen's Association, has made an extended trip through the East. During this trip, he met Philadelphia, New York and Pittsburg foundrymen who are enthused over the Detroit convention.

W. M. Corse, secretary of the American Brass Founders' Association, was in Detroit recently. He reports that the membership of his organization has increased over fifty per cent. during the past year. Mr. Corse is now with the Lumen Bearing Company, of Buffalo, and the new address should be noted when writing him.

Richard Moldenke, secretary of the American Foundrymen's Association, has returned from Europe and his whole energies are devoted to furthering the coming convention.

Joseph J. Wilson has recently accepted the position of general superintendent of the foundry departments of the General Motors Company. Mr. Wilson is chairman of the Plant Visitation Committee of the convention, and is already planning to give the delegates every opportunity to visit the new and up-to-date plants which have done so much to make Detroit a center of the foundry industry, especially relative to the automobile industry. He is conceded to be the greatest authority today on the production of auto engine cylinders in this country, and the work of his committee will doubtless prove to be one of the best educational features of the convention. It is not too early for those desiring to visit certain particular plants, to get into communication with Mr. Wilson, that he may make suitable preparation.

The boat ride on Detroit River and Lake St. Clair will surely be one of the most enjoyable features of the social part of the convention. The probability is that the local committee will use the *Ste. Clair*, the new steamer of the Detroit, Belle Isle & Windsor Ferry Company. This boat will go into commission just before the convention opens, and she is the very latest in pleasure steamer construction. She will handle fully 4,000 people, and no one will be crowded. The trip will last from late in the afternoon, until midnight, and good music, and something good to eat will be provided by the committee. Ladies will go along, of course. Oliver Phelps, resident manager of the M. A. Hanna Company, has charge of this.

Incidentally, speaking of Detroit as a foundry center, there are 10 foundries under construction here at the present time. Three of them will be the largest of their kind on the continent.

The local committee has already arranged for Postal and Western Union wires to be placed at the State fair grounds, and for telephones with a central switchboard and ample operators. The Detroit police department will furnish the needed uniformed men, and the fire department will station a company on the grounds, to give the needed fire protection. Electric projection apparatus will be provided, to anticipate the needs of those who desire to illustrate technical papers in a proper manner.

The chairman of the Convention Sessions Committee, Mr. W. P. Putnam, is perfecting arrangements to assist those who desire special features in their papers. Write him at 1111 Union Trust Building for anything wanted in this line.

James S. Keightley, superintendent of the Great Lakes Engineering Works, is chairman of the Reception Committee. He is so well known for his glad hand, that the right kind of welcome is assured for the delegates.

The Local Committee has established its headquarters at the Pontchartrain Hotel. President Waterfall and Chairman Stephenson will be found at Parlor H when they are not at the convention meetings.

The Foundry and Manufacturers' Supply Association will have its headquarters at the Cadillac Hotel. The American Founrymen, the Brass Founders and the Local Committee will have headquarters at the Hotel Pontchartrain. The Foundry Foremen will use the Griswold House as headquarters. All these hotels are located near together, and ample room will thus be made for all. The Hotel Tuller, the Metropole, the Wayne, the Ste. Clair and the Normandie, all within a few blocks of each other, will doubtless receive their quota of visitors.

The date of the convention is purposely arranged with the Detroit Convention & Tourist Bureau, so as to occur at the time when no other convention is in Detroit, thus offering the best possible accommodations to our delegates. Remembering the experiences of former conventions, it is well to reserve rooms at once, and be assured of a good place. The phenomenal growth in the associations reported by the secretaries, point to the largest convention in the history of the organization.

N. K. B. Patch is chairman of the Committee on Papers for the meeting of the American Brass Founders' Association. He reports that some very good ones are already promised. His address is Toronto, Ont., Canada.

PLATERS' WRINKLES.

Acid copper baths scarcely ever need addition of sulphuric acid when once prepared, free acid is constantly formed in solution while deposition is taking place. Alum will neutralize the free acid forming aluminum sulphate which has been found very beneficial in electro galvanizing baths and when added as alum (the double sulphate of aluminum and potassium) neutralizes the free acid and gives excellent results in the acid copper bath.

In using dextrine in a copper plating solution, always be sure to obtain the chemically pure article, as commercial dextrine contains gluten which invariably causes streaking.

THE MELTING AND REFINING OF GOLD AND SILVER.

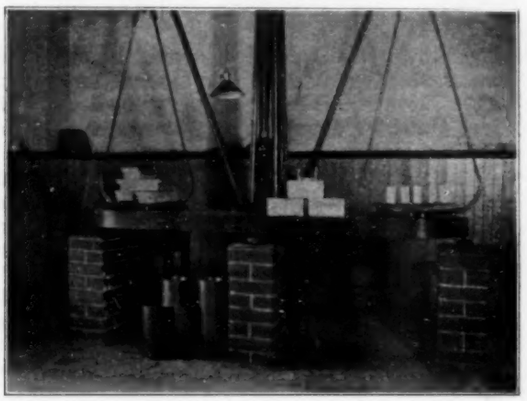
SOME RANDOM NOTES ON THE TREATMENT OF GOLD AND SILVER BEARING METALS.

BY HUBERT D. COLEMAN.*

Deposits of all characters are received as bullion at the mints and assay offices of this government, if their combined contents of gold and silver be above 200 fine parts to the one thousand. This being the case, the variety of deposits is very great: A, bringing a lot of old jewelry, B, some gold dust direct from the mine, C, some amalgam, D, a lot of dental scrap, and so on. This latter stuff, if any sweepings are present, should be first panned well, dried, and then with a magnet have removed all loose particles of iron or steel which are usually numerous in this class of deposits, and are mostly parts of broken fine steel nerve extractors.

Iron is not easily alloyed with silver or gold, but causes considerable trouble by imbedding itself into the surface of the bars when poured and while easily outlined by the eye, if it is steel or wrought iron it is so firmly imbedded as to cling tenaciously, and if removed by chipping this method will carry with it considerable of the precious metal. If it is cast iron, it is usually found in globular or bulbous shapes half imbedded, and can be generally removed by impact directly on the iron spheroid. Of course, if the magnet had not been used originally and iron was found in the melt after most of the deposit had gone down, iron being of a lighter specific gravity and higher melting point than either gold or silver, it might be removed from the surface by skimming, but caution must be observed here, for much of the precious metal will be found clinging to the iron.

OVER $3,000,000 IN PURE GOLD BULLION IN BOXES AND ON TRUCKS.



EQUAL WEIGHTS OF SILVER AND GOLD. SILVER VALUE $1,026; GOLD, $38,195.

Whenever these deposits are free from impurities as far as the eye can discover, they are simply melted down with borax, and a clear bar usually results. If amalgams are received, the excess mercury is squeezed out through a canvas bag, then the deposit is melted over a slow fire until the mercury has been completely volatilized. Of course the depositor is notified beforehand that his amalgam will show a loss in gross weight upon melting as high as 75 per cent. of the original weight.

If from the appearance of the bar deposited—which may be scaly, rough and yellowish on its upper side (as poured)—one is led to believe that unreduced sulphides are present, it may be tested when the metal is in the molten state, by inserting an iron stirring rod which will very promptly have its end eaten away if sulphides are present. Iron may be supplied to the melt until no more action of this kind takes place, or if an excess has been put in it may be removed by skimming and afterwards by the use of nitre. The presence of sulphide of antimony will be shown by an insoluble brick dust color deposit, if some of the metal be dissolved in nitric acid. Iron will reduce antimony and it will volatilize. Nitre is used to toughen melts by removing base metals in this way. The oxygen of the nitre combines with the base metals, making oxides of these metals. These oxides combine with the potash or soda of the nitre, making a glass which floats on top and may be removed by skimming. Nitre is not a perfect or complete toughener by any means, as its action throughout the entire body of the melt is impossible to get; then too, an objection to nitre is that skimmings will carry off too large a percentage of the precious metals, which of course must be recovered afterwards, but separates these values for the time being and entails extra labor to bring together again. Nitre attacks severely a black lead crucible and should only be used through an eye of bone ash on the surface of the melt, which not only helps to protect the pot, but serves to stiffen the silicate, which is then more readily removed.

If deposits contain lead most of it can be removed by the use of sal ammoniac; this is a cheap and harmless agent for the removal of lead. It should be charged in frequent small doses. After most of the lead is removed, the operation may be completed by the use of corrosive sublimate. Corrosive sublimate is a very active but a very dangerous flux and also expensive, and should only be used on furnaces provided with hoods. If the deposit containing lead is small, with the percentage of lead large, if a suitable furnace is at hand a bone ash cupel may be used to good advantage.

The use of cupric chloride for toughening a brittle melt of standard gold (i. e. 90 per cent. gold, 10 per cent. copper) has been known for some time. Recently, however, the mint at Philadelphia has perfected a method for the use of this chemical by means of which a bell-shaped black lead and fire clay stirring rod introduces the chemical to the bottom of the molten mass. The chlorine while escaping unites with the troublesome base metals, carrying them off, leaving the gold and copper in proper figured proportions of standard metal. Chlorine gas alone can be used for this purpose, but this dangerous gas must be handled with great care and special apparatus used for delivering it to the body of the melted mass.

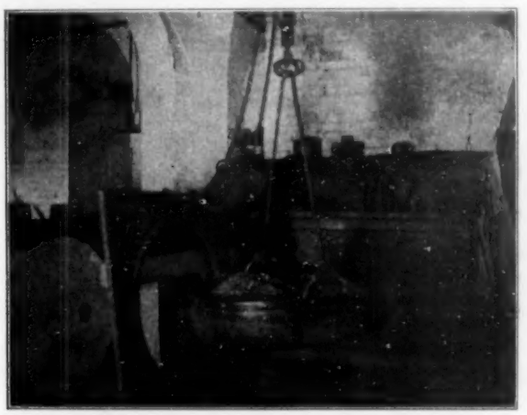
*Melter and Refiner, United States Mint, New Orleans, La.

The electrolytic method of refining is being extended to all the mints—by this method the objectionable acid fumes are entirely done away with—there is practically no loss in gold or silver, the platinum contained in the deposits is readily recovered, and finally the great saving in cost of acid over the old processes makes it much the cheapest method of refining. Of course as the cathodes must be strips of pure gold in the gold cells, and permanent hangers and conductors of pure gold used, the values tied up in this process may be enormous, and a matter of great consideration to all concerns not backed by ample capital. By the electrolytic process gold is refined to within one ten thousandth part of absolute purity.

THE NITRIC ACID PROCESS.

The United States mint at New Orleans, La., is the last to use the nitric acid process for separating gold and silver. This old process is believed by many to have been known to Geber, the Arabian chemist, who is said to have been the discoverer of nitric acid. It is said, however, that until Biringucco, in the year 1540, published his remarkable work, a complete detailed account of the process of separation by nitric acid was not to be found.

ACID HOUSE WHERE GRANULATIONS ARE FIRST TREATED WITH NITRIC ACID. PORCELAIN VESSELS HOLD 30 GALLONS EACH.



COPPER BASKET OF GOLD GRANULATIONS JUST RAISED OUT OF ICE WELL. VALUE ABOUT $22,000.

It may be of interest to review casually the process as carried on here today, so as to show those not familiar the simplicity of the method, and also the values in the refinery each day. It is our custom to consolidate all deposits that require refining, and each month make one, two or three mass melts of same.

This is done for two good reasons: in the first place, numerous small bars of varying finenesses are merged by melting into a fewer number of larger bars of the same fineness, which in this shape are the more readily cared for and handled; then, by melting these individual deposits as a whole and assaying the mass melt, we are in a position to absolutely check the total amounts of gold and silver charged against the sum of the individual amounts. In preparing a granulation melt for refining, bullion is selected and proportioned so that the fine silver contents is about 2⅓ times that of the fine gold. This being the case it is always necessary to add fine silver to a melt, and the constant redissolving of this same silver is one cause for the high cost of the process. Best results are secured by selecting bullion whose combined contents of gold and silver will assay above 900 fine.

A lot of very low-grade stuff may be worked up by distributing its bars throughout numerous granulation melts. These melts are made of about 2,500 Troy ozs. each, of the proportions just mentioned, and granulated one after the other in the same ice well. This gives a total mass in granulated shape of 5,000 ozs. of bullion, which is divided into three equal portions, and in the same acid house boiled in 32-deg. nitric acid in porcelain jars on the water bath for 24 hours, changing the acid on the second day and washing well the residue after each boiling. After removing the nitrate solution, this gold residue is again washed thoroughly, filtered and boiled in cast iron pots over a gas furnace, this time in 66-deg. sulphuric acid for eight hours. This acid takes up the carried over base metals and also silver not acted upon by the nitric acid. It is then washed well with hot water, filtered and dried, then melted with a little nitre, and a fineness usually of 999 or a little less results.

The silver nitrate solution containing the base metals soluble in this acid is poured into wooden cisterns containing a brine solution, the working capacity of each cistern being about 7,000 fine ozs. of silver in the shape of chloride after being precipitated by the brine. These cisterns have central shafts of wood with agitator arm, rotated by a quarter twist belt from line shaft. When all the silver chloride has been thrown down and made sweet, it is reduced to the metallic state with granulated zinc in the proportion of 23 pounds of zinc to 1,000 ozs. of fine silver. The silver is then washed well, filtered and pressed into disks 12 ins. diam. by 4 or 5 ins. thick, dried by heat, then melted with nitre and a fineness of about 999 results. There are three fine gold melts in the refinery undergoing different operations at the same time; as this represents about $84,000 in gold and $5,000 in silver, it is quite sufficient to keep those in charge constantly concerned while the operations progress.

A WRINKLE FOR JIG SAWS.

In saw-piercing with a power jig saw, such metals as sterling, german silver, brittania, copper or brass, it will be found that by placing between each layer of metal a sheet of thin paper well soaked in any lubricating oil, that this method will permit the sawing of several layers of metal at one time. Of course, the harder the metal and heavier the gauge, the fewer the layers. For instance, in sawing out ornamental work in brass, such as panels for lamp shades, etc., in 20 gauge, from four to five layers can be cut at once with this simple method, or in brittania metal, gauge 20, from six to eight layers is possible. However, the quantity can best be determined by experiment. It is usual to have a frame or box to hold the metal layers in place while sawing.

A. F. SAUNDERS.

MODERN BRONZES*

THEIR CONSTITUTION, PROPERTIES AND USES.

BY A. H. HIORNS.†

(Concluded from March.)

PHOSPHOR BRONZE.

Some phosphor bronzes contain zinc or lead, as:

Copper	83.7	84.8
Tin	8.0	7.0
Zinc	8.0	4.0
Phosphorus	0.3	0.2
Lead	...	4.0

Figure 5 is phosphor bronze with lead showing free lead. Phosphor bronze is utilized for wires for electric installations, on account of their high tenacity, although the conductivity is not high. Wires are made with 50 to 60 tons tenacity, with about 25 per cent. the tenacity of pure copper. They are specially used for telephone purposes and known as telephone bronze. They permit of a much greater span than copper. The following table shows the strength of Melloid bolt (phosphor bronze):

	Breaking stress in tons per square inch ordinary temperature.		
		215°	315°
Melloid bolt.....	28.8	...	25.5
" Annealed.....	19.2	18.8	...
Copper	13.8	10.2	...

MANGANESE BRONZE.

We must not confound manganese bronze with brass containing manganese, nor with cupro-manganese. True manganese bronze consists of copper, tin and manganese. I may say it is but little used, but

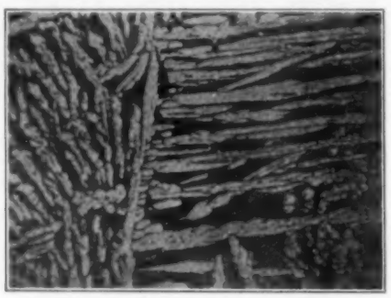


FIG. 7. ALUMINUM BRONZE WITH 7.35 TO 10 PER CENT. COPPER.

a little manganese increases the tenacity and elongation. The following tests by Guillet show the properties:

Cu.	Sn.	Mn.	Zn.	Tensile strength in tons.	Elongation per cent.	Shock.	Hardness.
91.0	8.70	.....	0.25	15.7	23.0	5	63.
90.0	9.2	trace	0.70	17.0	28.0	4	54.
87.6	10.4	1.7	0.30	13.5	20.0	3	51.
89.0	9.0	0.7	1.30	10.3	7.5	4	60.
86.0	8.6	3.1	2.30	7.4	0.0	2	7.1
83.0	9.0	9.0	1.00	BRITTLE.			

From these results we see that it is not advisable to use more than 1 per cent. manganese. The same results can be obtained with a little phosphorus.

*Paper read before the Birmingham Metallurgical Society.
†Professor of Metallurgy.

Bronzes have also been employed containing both manganese and phosphorus. A bronze of the following composition has been recommended for propellers: Cu—92, Sn—8, Zn—3, and Mn—0.5 with a trace of phosphorus. It gave a tenacity of 16.4 tons per square inch and 40 per cent. elongation. Such a bronze is usually very sound, but it is not so if the zinc be omitted. When the amount of copper falls below 90 per cent., the bronze is less malleable than when it is free from manganese, but the contrary is the case when the copper exceeds 90 per cent.

SILICON BRONZE.

Silicon plays the same role as phosphorus in bronze: it reduces metallic copper oxides, forming silica, which pass into the slag. Silicon in bronze increases the strength, and similar to that of phosphorus, but does not lower the conductivity to anything like the same

FIG. 8. ALUMINUM BRONZE OVER ANNEALED.

extent as phosphorus. Silicon bronze is valuable for its strength, comparatively high conductivity, and resistance to corrosion and is therefore valuable for electrical purposes. A bronze with 89 copper, 9 tin, 1.5 zinc, 0.5 lead and a trace of silicon, gave a tenacity of 17.2 tons per square inch, with an elongation of 20 per cent.

BRONZES WITH ALUMINUM.

These bronzes must not be confounded with aluminum bronzes which consist of copper and aluminum only. They should only contain very small quantities of aluminum, in fact, just sufficient to reduce the oxides in copper-tin alloys. In bronzes containing aluminum the latter seems to exist in the alpha solution, like zinc and manganese. An alloy of 89 copper, 9 tin, 1.5 zinc, 0.5 lead, and a trace of aluminum gave a tenacity of 19.4 tons per square inch and 43 per cent. elongation. This shows that aluminum has a greater strengthening effect than silicon. When the amount of aluminum has reached 0.4 per cent. the tenacity has fallen considerably with an enormous fall in elongation. We may therefore conclude that aluminum except in very small quantity is deleterious in copper-tin alloys.

ALUMINUM BRONZE.

These are alloys of copper and aluminum manufactured in different qualities by varying the aluminum. The alloys containing 90 per cent. copper and upwards are those employed in industry. When aluminum is added to molten copper a great evolution of heat is observed which led to the idea that a chemical compound was formed. But it may be attributed in part to the reduction of oxide of copper contained in the copper.

Copper-aluminum alloys have a gold color up to 14 per cent. aluminum, and beyond that they are grayish-white or white. Up to 10 per cent. aluminum the alloys are malleable, but beyond that they are brittle. At 20 per cent. aluminum they can be crushed in a mortar. The whole series have been closely studied by Chatelier, Guillet and Carpenter.

There is a definite compound, Cu_9Al at about 88 per cent. copper and $CuAl_2$ at about 54 per cent. copper. These compounds are dissolved in copper or aluminum and form solid solutions.

Commercial aluminum bronzes may therefore be divided into two groups, namely: Those with 0 to 7.35 per cent. copper, Fig. 6, and those with 7.35 to 10 per cent. copper. All alloys in the first group consist of simple solid solutions, alpha, and are very malleable. Alloys of the second group contain a second constituent, beta, which imparts a higher tenacity but less ductility, Fig. 7. Above 12 per cent. the alloys are very brittle, due to the compound Cu_3Al.

Aluminum bronze tubes are liable to crack like brass upon storage, if too much work has been put on them in drawing. It crystallizes on annealing like brass, and may be burnt by annealing at too high a temperature, Fig. 8. Carpenter and Edwards found the rolled metal to have the following properties:

Al.%	Condition.	Tensile strength.	Elongation % on 2 ins.
0.10	Not annealed	14.5	65.
	annealed	14.1	65.
2.99	Not annealed	19.79	86.1
	annealed	18.54	89.4
5.76	Not annealed	28.4	76.9
	annealed	27.2	75.0
7.35	Not annealed	29.7	74.3
	annealed	23.9	72.0

Beyond about 7.5 per cent. of aluminum the elongation rapidly falls and the tensile strength reaches a maximum at about 10 per cent. It contains some of the beta solution which increases with increase of aluminum.

As regards the general heat treatment the properties are little affected by slow or quick cooling of alloys of the first group (0-7.5 per cent.), and thus differ from the alloys of the second group which contains the beta constituent, which is an unstable solution and is greatly altered by heat treatment. Aluminum bronze is rapidly affected when exposed to abnormal temperatures, such as the fire boxes of locomotives. It also undergoes considerable contraction on cooling, which must be allowed for in castings. Nickel has been added to aluminum bronze to increase the hardness and strength. The same remarks apply to silicon. The reading of the paper was followed by a discussion which is published in full below.

DISCUSSION.

The President, opening the discussion, said that they had listened with great interest to Mr. Hiorns' paper. Mr. Hiorns had dealt with a very difficult subject, and had explained the difficulties as only an old master could. There were many points in the paper which they would not be able to carry away with them. They could not be expected to carry away the number of figures, but if they remembered the principles, as Mr. Hiorns had said, the evening would not have been spent in vain. He was interested in the reference to the equilibrium diagrams. They might take it as a simple rule that they started with Alpha in alloys with copper-zinc or copper-tin. Alpha was soft, Beta was unusually hard, Gamma hard, and Delta even harder. As they took each letter farther down the alphabet they got a harder metal. Some of them might have read: "The Song of the Bell," by Schiller, that very beautiful and interesting German story of how the bell was cast. The poet tells them to get ready to melt, to light the fire, and then finally to cast the bell. There were a couple of lines in that poem which expressed what Mr. Hiorns had been expressing, although it was over a hundred years old, and in the language of poetry and not of metal: The English version of the lines was: "If the brittle and weak unite together in good proportion." That was a poet's method of expressing what went on in the bronze and it was really the basis of all foundry work. That phrase always seemed to him to contain the essence of founding whether in brass, copper or bronze. The great question was whether they could mix together in suitable proportions that hard, or Beta constituent with the Alpha. If they had too much of the hard constituent, the article was brittle; if too much of the soft, it would not stand wear. Another of the points which the ancients knew so well was that when they had crossed the line, indicated on the diagram, they had a change. The alloy came out either soft or hard, according to the rate of cooling. From a practical point of view, if they wanted to know the temperature at which the change took place it was just then the metal became visibly red in a moderate light. If they quenched at that moment, all would be well; if it were allowed to go beyond that temperature, they would get a hard substance.

Mr. R. H. Greaves said that there was a danger, sometimes, when reading the diagrams of those copper-tin alloys, of trying to get out of them more than they stated. In the diagram for copper-tin between 9-22 per cent. tin they had a line at 490 degs. That line simply meant that at the temperature of 490 degs. the mixture of Alpha, Beta, Delta, would remain in equilibrium. It did not state that the alloy quenched at above 490 degs. would necessarily be called Alpha-Beta. The diagram gave valuable light as to the changes which might be expected to occur according to the greater or less extent of certain constituents. It was not, of course, intended to include all conditions, for instance, the condition of casting temperature which had great effect upon the properties of bronze. Mr. Longmuir had shown that gun metal cast from the same crucible at intervals of two minutes, at slightly different temperatures, would present widely varying properties. As Mr. Hiorns had stated, there were many elements added to the bronze to constitute special bronzes and in many cases the effect of an added element was to act as a deoxidizer. In come cases, there was not much doubt of that being so, as, for example, in the case of phosphorus, but in the case of manganese, there seemed to be some doubt. Experiments showed that manganese in manganese-bronze acted not in eliminating oxides, but merely in changing the form of the combinations. The lecturer had given, as an example of one of the different alloys used for bearings, nickel-lead-bronze, which had had such a

wide use in America. He would like to ask whether nickel in bronze was sufficiently rigid to be used in a bearing, in work and out of work, as railway axles.

Mr. F. Johnson, B.Sc., expressed surprise at one reference by the lecturer. He had never before heard of the ductility of a solid solution being improved by quenching, with density remaining constant. When an alloy was cooled in practice at the ordinary rate of cooling, they had copper-red crystals spreading out and being surrounded by a liquid richer in tin. After cooling sufficiently, the re-transformation took place; copper absorbed more tin, and tin, as it were, took up more copper, the liquid assuming the same composition as the solid. Then, if another step was made in the cooling, the copper-red material again spread out, reaching the cores. A further prolongation at the temperature for a certain period of time resulted in equilibrium again being obtained. Mr. Hiorns had given them a list of bronzes with tensile strength and elongation, but it was not stated on what length of specimen the elongation was calculated. Were those bronzes actually tested at the temperatures mentioned, or were they quenched off at those temperatures and then tested?

Mr. Spittle had generally understood that the natural and best condition of metal was produced by slow cooling, that was to say, the crystals were then in the state which they would naturally assume. Metals generally had a tendency to return to their natural condition when cooled in the shortest possible space of time. Mr. Hiorns had stated in a previous lecture that ordinary lead put on a roof and allowed to remain there for a number of years returned to its natural cast state. Supposing that were true of all metals, he wondered whether, taking that particular series of alloys of 9-22 per cent. tin, if they were quenched at the same temperature above 500 degs., they would have a tendency to fall back to their natural condition if allowed to cool slowly. In selecting metal for bearings, they would have to consider its suitability from the point of view of the strain and weight placed upon it, and whether, under practical conditions, it would tend to get very hard and brittle in a short space of time.

Mr. Rogers, referring to the lecturer's use of the term "bronze" as signifying alloys of copper and tin, and also some alloys which did not contain tin at all ,said he should like to make a suggestion, namely, that the new alloys should bear a name indicating, as far as possible, the constituent metals employed. Old names, that had been in use for years and were as familiar as household words, did not, as a rule, indicate their constituents. That was no reason why they should hesitate to adopt a new system of nomenclature. For instance, what they called "brass" was known to contain Cu.Zn., plus, of course, impurities, "gunmetal" and "bronze" contained copper, tin, zinc and sometimes phosphorus.

They appeared to use the term "bronze" indiscriminately for many alloys of varying composition. They had "statuary," "phosphor," "managanese," "aluminum," "arsenic," "carbon," "coinage," "naval," "nickel," "silicon," "leady," "acid," "Tobin" (2 per cent. Sn.), "stone," "Ajax" (Ph.), "Clamer" (Ph.), "Damar" (Ph.), "Harrington" (1 per cent. Sn.), "Hardware" (gun metal), and a number of other bronzes. Some of those alloys, which were well known, conveyed some idea of their composition to the student in metallugy, while others failed to do so, and were a complete puzzle both with regard to their composition and uses. In his opinion, only those copper alloys which contained more than 2 per cent. tin should bear the name "bronze."

Those containing less than 2 per cent. tin, and all copper-zinc alloys having small additions of Sn., iron, aluminum, manganese, etc., should bear the name "brasses." Thus, 67—37 and 1 tin should be "naval brass"; 60-40 type, with manganese should be "manganese brass," and so on. The term "high tension brasses" should be applied to brasses made of copper 55-61, to which had been added (in addition to the zinc) iron, manganese, aluminum and nickel, with the object of obtaining a very strong alloy. In the bronzes proper, the speaker had no wish to suggest any alteration of the names which indicate an added element, as in the case of phosphor bronze (Cu.Sn.P.), manganese bronze (implying a large percentage of Mn., with tin or zinc), silicon, coinage and leady bronzes (the latter containing Cu.Sn. and a large percentage of phosphorus).

Among other copper alloys, they had cupro-nickel, which was a modern production and indicated its own composition. Yet even here, owing to the tenacity with which they held to the old idea of calling an alloy a bronze, merely because it had copper as its base, the name nickel bronze continued to be applied to it until 1888. Fortunately, owing to the insistence of the government at Woolwich, where it was largely used, the name was changed to "cupro-nickel." This might be aptly applied in many other cases, i. e., alloys of copper-manganese might take the name: "cupro-manganese"; alloys of copper and Silicon, "cupro-silicon," and so on.

Instead of calling Cu. and Al. alloys "aluminum-bronze," they used the term "cupro-aluminum," unless part of the aluminum was replaced by tin, or vice versa. In that case, the alloy was known as "aluminum-bronze." These were purely suggestions for remedying the existing state of things. The need for the change was apparent when they saw the fancy names that were being made use of to denominate the various alloys. It seemed to him this was a direction in which their society might usefully exert its influence.

Mr. Hiorns, replying on the discussion, said that with regard to Mr. Greaves' question on nickel bronze, copper-nickel formed a solid solution, and, as in the nickle-lead-bronze, the element copper existed up to 92 per cent., they might consider that the copper, tin and nickel would form no solid solution. When the nickel finally passed into solution, the Alpha solution should have the power of preventing the lead from segregating. With regard to Mr. Johnson's remarks, he could only say that the tables he had shown were not from his own experiments; they were quoted from very great authorities. Mr. Johnson had referred to the question of changes taking place in solution. Those changes did take place, but they required time, and if time was not given the change would not take place. They would find on referring to that table that some of the specimens were annealed and some quenched, so that the densities and elongations given in the table referred to annealed and quenched alloys respectively.

His answer to Mr. Spittle's question was that the changes took place at different stages. If cooling were sufficiently slow, the changes would take place, and, finally, a state of equilibrium would be attained. Quenched metal was always likely to crack and break. Bearing metal performed special functions; that was to say, one part gave to the bearing resistance, while the harder metal supported the axle. Mr. Rogers had made a suggestion regarding the collection of names of bronzes. He (Mr. Hiorns) thought they would be doing a good thing, if they were to ask Mr. Rogers to tabulate a list of bronzes.

THE APPLICATION OF TRANSPARENT ENAMELS.

By Winfield E. Dunham.

W. E. DUNHAM.

With the exception of certain lines of emblematic work, transparent enamels are today rapidly taking the places of opaques, especially on most all lines of ornamentation work. Jewelry manufactured of gilding metal and gold, unfortunately, cannot be successfully enameled with most of the transparent colors. Red, blue and some shades of yellow and purple work satisfactorily, but the vast majority of delicate shades so extensively used today fade almost into oblivion when applied on these metals. Red enamel, unlike some of the other transparent colors, has never been manufactured as an opaque color without a decided change in its color. There are other transparent colors whose shades are fairly well duplicated in the opaque but for finish and beauty the comparison is so great that they find little room in the wide range of ornamentation work manufactured today.

In the process of applying these enamels to the stock of the piece and the result acquired there are always present uncertainties which confront the enameler from time to time. It may be the enamel surface appears porous or perhaps iridescent or semi-transparent, but the one great detriment to the successful finish of the enamel is the water with which it has been ground.

Enamel has been prepared for charging by being ground in various oils and proven very satisfactory, but as a general rule today most enamelers prefer water, especially for its economic value. Water that has been distilled by evaporation in platinum vessels is most assuredly the best and safest, as this process leaves no residue, which is the most harmful agent of the water. This residue, found chiefly in hard water, is usually carbonate of lime or magnesium; the chlorides and sulphates of lime or magnesium are soluble in water but the former never, unless the water contains carbonic acid gas (CO_2), hence it is obvious that we must have a sedimentary deposit of carbonate of lime or magnesium which will accumulate so long as the enamel is kept in water.

The effect of this residue in the enamel varies in different colors: transparent colors seem to be the most affected, and it is noticed chiefly by the pitted surface which can not be eradicated by repeated firings or chargings. Just as an alloy finds its affinity with certain metals, transparent enamels find their chief medium in their application upon silver, no other metal used today in the manufacture of jewelry being as good. Silver, in order to be properly enameled with these colors, must be carefully firestained and the enameler must know when the pieces that are immersed in the solution are in just the proper condition to be enameled.

The firestain solution, in order to work satisfactorily, should contain equal parts of nitric acid and water and be heated to a temperature of 150 degs. Fahr. If the solution is worked at a much reduced temperature the results are not so good, especially if the piece to be enameled should contain soldered parts, as joints and catches, that are composed of German silver or white metal, the acid making these parts perceptibly weak. If much work is being immersed in the solution great care must be taken not to allow the solution to become saturated with nitrate of silver which sometimes tends to pit the surface. When the solution shows signs of being saturated it should be immediately precipitated with muriatic acid and a new one made. The excess of silver is easily detected by its deposit around the edge of the piece, or more generally, around the joint and catch, especially if they be made of composition of nickel.

The average jeweler, and the writer dares say, some enamelers, today know little of the actual meaning of the term "firestain," except believing that it is a stain taken out of the silver by means of nitric acid. This solution is correct as far as it goes, but the successful enameler must know more than that to produce repeatedly the best results with his transparent colors. The firestaining of silver consists of bringing to the surface of the silver stock the stain or oxide produced by the action of heat applied to the metal. This stain otherwise would not be produced if the metal were pure silver, but as sterling silver contains an alloy with its proportionate share of 75/1,000ths, we can readily see that the remaining 925/1,000ths does not constitute the whole. Therefore, this stain that is brought to the surface of the metal is no other than nitrate of copper. So, by scratch-brushing off a thin film, we still have left an abundance of the alloy or copper. Red enamel may take a variety of shades after this operation, differing when the surface of the piece contains more or less copper. Red may appear almost brown on silver that has not been subjected to the firestain solution. It, therefore, more than any other color, requires greater skill in the method of firestaining, as the enameler must know, not only by the strength of the solution, but by the appearance of the metal, when it is properly prepared for red enamel. Other transparent colors, with the possible exception of flux, give good results where red may fail, but as a rule, whatever amount of firestraining that will produce a good red will work satisfactorily with most all transparent colors.

The colorer finds his greatest trouble in the coloring of silver goods that contain transparent enamel and many manufacturers are easily discouraged and loathe to undertake the manufacture of enamel goods from this one standpoint. It is certain that greater care must be taken in the coloring of enamel goods than with those that are devoid of it, but the blame does not always rest with the colorer. The pieces may contain some infinitely small crack in the enamel surface that is not readily visible to the naked eye, which may be caused by pin stemming or polishing, and when the pieces are strung in the solution the enamel immediately chips out. Such incidents as these will always accidentally happen, but when the enamel is repeatedly chipping the solution is not running right. Experienced colorers prefer a high voltage and a low action of cyanide of potassium to properly overcome this result. If the voltage be low, the duration of the time pieces are suspended in the solution working with a greater amount of cyanide, tends to chip the enamel. Enamel cannot be chipped from a metal surface except by the action of contraction or expansion, and it is, therefore, readily observed that the longer the enameled pieces are suspended in the solution, if it be hot, the more apt the enamel is to be chipped by the expansion of the metal.

The cost of repairing work that has been chipped by the action of the coloring solution is usually greater than re-enameling the work, as the enamel that is left intact with the metal surface oftentimes bubbles or blisters when the heat is applied. The best way of repairing such work is to immerse pieces in hydrofluoric acid until the enamel is all eaten out and re-enamel. If the depth of the compartments is lessened by stoning and polishing, the transparent colors will inevitably take a lighter shade, making the repairing very noticeable, but this is the most practicable and the cheapest way of repairing chipped enamel surfaces.

In the application of transparent enamels the die cutter and the enameler may be said to be working in unison, the one cutting in steel the exact shape and minute outlines, and the other seeking to portray the garment that the master hand of Nature has given them and endeavoring to reproduce in some slight extent the true coloring.

THE MOLECULAR STATE OF BRASS AND BRONZE ALLOYS.

A Dissertation on the Application of Various Reagents Used to Preserve Homogeneous Structure.

By C. P. Karr.*

(Concluded from March.)

TITANIUM.

According to A. J. Rossi, this element can be used successfully as a deoxidizing agent for copper alloys in the form of a cupro-titanium, an alloy containing from 8 to 10 per cent. of titanium . From one to two per cent of this alloy may be used. The oxygen it takes from the copper forms an oxide of titanium and floats on top of the fluid charge; it eliminates nitrogen as well as oxygen and if not used in excess does not contaminate the subsequent product. It dissolves easily in lead and iron and alloys readily with copper and tin; it makes a close-grained dense structure and promotes a homogeneous molecular state. For high grade steam metals demanding imperviousness to water or steam pressure it is superior to silicon. Lead does not interfere with its action upon copper alloys and it may be used with brass alloys rich in zinc without detriment.

ZINC.

Zinc is not generally classified as a deoxidizing agent and yet it is one of the best we have. It is so common as to have been overlooked. Its affinity for oxygen, however, is so great, when passing from the solid to the fluid state, that it will instantly decompose all fluid oxides of copper with which it comes into contact; it will deoxidize the tin oxides equally well. When melted at the proper heat about 1½ per cent. of the zinc used is volatilized and about this same amount is required for deoxidizing purposes. Only the purest brands should be used. In a nickel alloy containing a large percentage of zinc, borax may be used profitably as a deoxidizing agent. Compare V. Tafel (Metallurgie, 1907, Bd. 4, p. 782).

ARSENIC.

Arsenic in small quantities acts as a deoxidizing agent upon both cast and rolled brass, and is really beneficial. If the amount of arsenic be kept down as low as 2/100 (0.02 per cent.) of 1 per cent. it produces a smooth, sound cast bar and rolls well; by some authorities it is believed to have the power of softening rolled brass and making it more malleable; but a brass containing 5/10 of one per cent. will crack in the rolls. For a cast brass 1/10 of 1 per cent. acts as a powerful deoxidizing agent and perfects its molecular state to such an extent that it may be used to advantage in high grade steam metals. It may be used as arsen-copper (50 per cent. arsenic) alloy.

CONCLUSION.

When a casting with many flat projecting and adjacent surfaces is poured at the usual temperature flaws develop upon cooling in the interior, where they cannot generally be discovered until the hydraulic test reveals the defective molecular structure. This difficulty may be overcome by the judicious use of proper feeding gates and risers properly placed in most cases, but not always. When such a case arises it is generally due to unequal cooling of the shell of the casting because of a varying sectional area. Where for other reasons this area cannot be made uniform the founder may resort to steel chills inserted in the sand adjoining the pattern, and the depth and the extent of the chill may be modified at will by surfacing the steel with a pad of asbestos paste, an innovation recently tried with great success in Germany in the chill molds for pouring bars that are to be rolled or drawn.

In conclusion we should say that all of the deoxidation agents referred to, all the possible elimination of impurities, all the absorption of occluded gases, all the devices resorted to for the purpose of procuring a uniform shrinkage, unite to form an ideal molecular structure and help to solve the founder's perpetual problem.

*Chemist Nathan Manufacturing Company, New York.

URANIUM IN THE UNITED STATES.

Uranium is found commercially in only two minerals in the United States, pitchblende and carnotite. Pitchblende, which is widely known because of its use as an ore of radium, occurs in quantity in the United States only in Gilpin County, Colo., where there are four mines that produce it. Carnotite occurs as a bright yellow powder in sandstones in Utah and Colorado. Uranium minerals are radioactive, and their radioactivity may be tested by their effect upon a photopraphic plate, which will show shadows of metallic objects placed between it and a specimen of uranium mineral.

Uranium has not yet been put to many practical uses. It is said to be used in steel making in Germany. Uranium salts are used in iridescent glass and in pottery glazes, and uranium compounds are employed in chemistry and in medicine. A number of the uranium salts are violent poisons. Uranium and uranium salts were imported into the United States in 1908 to the value of $7,145, according to F. L. Hess, of the United States Geological Survey, whose report on uranium and other rare metals is published by the Survey as an advance chapter from "Mineral resources of the United States, calendar year 1908." A copy of this chapter may be obtained free on application to the Director of the Survey at Washington.

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CONTENTS

DANGERS OF THE CASTING SHOP.

SUGGESTED METHODS FOR THEIR ELIMINATION.

Commonly speaking, the occupation of a caster or one who works in a casting shop may be said to be no more hazardous than any other portion of the work attached to the operations of a modern brass mill. But, however, when we take up and analyze the average casting shop worker's daily work, we find danger lurking in every corner. The dangers peculiar to the brass casting shop may be grouped under two heads:

1st. The menace of life and limb.

2d. The effects on general health.

BURNS FROM MELTED METAL.

Under the first head perhaps the greatest natural danger that the brass worker faces is the possibility of injury due to burns. It is a well known fact that burns from melted copper and brass are considerably more dangerous than those caused by steel or iron, even though the temperature be not so high. This is due to the action of copper on the juices of the flesh, so that burns from this source are quite frequently very serious and leave the victim with lasting sores.

One of the chief causes for disagreeable results from a burn caused by brass is neglect. The man who may be burned in a slight way does not think it of enough importance to attend to it properly and the result is, that after a while, when the poison has had a chance to get in its work, a serious sore has developed. When the doctor is finally called in, the case has gone so far that drastic measures have to be resorted to; very frequently the victim suffers the loss of a finger, hand, or foot.

When a person is burned by molten brass, if it is small and over only a small area, as from a flying spatter of melted metal, the burn should be first washed with a warm solution made of a mixture of fifty parts of water containing two per cent. of carbolic acid and fifty parts of a strong solution of sodium carbonate. After the pain has subsided, a bandage should be put on saturated with a mixture of 80 per cent. strong lime water and 20 per cent. boiled linseed oil. After the blister that has formed has broken or been reduced, the burn should be dressed with hydrogen peroxide diluted one-half with water and the wound will quickly heal without inconvenience. These solutions should be kept on hand in an easily accessible place in the shop.

If the burn is serious and covers a large area, the first thing to do is to call a physician. Pending his arrival, apply the carbolic acid and soda solution to the burned parts as gently as possible and leave the rest of the treatment for the doctor. Burns, of course, are the most

frequent accidents that take place in a casting shop and while they cannot be eliminated altogether, the seriousness of them and after results can be minimized to a certain extent by following the above instructions and the exercise of due care mixed with good judgment.

SOME OF THE CAUSES OF BURNS.

Burns in the casting shop may come from a number of causes, any or all of which are unavoidable. One of the most common causes is from the metal spattering or slopping out of a too full crucible as it is drawn from the fire. The man pulling the crucible may not have the end of the crane entirely even with the furnace; and when the crucible is hauled out, it may strike the edge of the furnace top, thus spilling some of the metal on the feet of the man guiding it. Again, while it is being swung over to the "skimming" plate, it may also slop over and spatter the metal on the floor and on the feet and legs of the workers near by.

The obvious remedy for the above accidents is not to fill the crucible so full, but as long as casters are paid by weight of metal cast, this is bound to happen. Another source of spattering metal is, when the crucible is being tilted to pour the metal into the mold. Too large an amount of metal may be poured out at first and it thus spills over and strikes the clothing and person of the caster. When a crucible is run until it is nearly worn out, it may be and often is, desired to get one more "heat" out of it. It starts to leak in the fire and is then hastily withdrawn and its contents poured either into another crucible or into the mold, this procedure generally results in burns. Or it may suddenly break while in the air on the end of the crane or even when half poured and the contents goes in all directions, with no respect for whom it may strike.

This is a prolific source of burns and one that cannot very well be eliminated, for there is no DEFINITE way of telling whether a crucible has reached its limit or not. It is best, however, to be on the safe side and discard as unsafe a crucible, which even in the judgment of the user, is still "good for another round." The practice in general, we regret to say, is to get out of the crucible all there is in it in the way of "melts" and this has caused and does cause a large number of accidents in the way of burns.

EXPLOSIONS AND THEIR CAUSES.

Explosions are invariably caused by the coming in contact of melted metal and moisture in various forms, either from wet metal or tools, introduced into the casting shop other ways accidentally or intentionally. Under this class of accidents we have in mind a recent tragedy in a Connecticut town where a caster's life was snuffed out without the slightest warning. Working under the highest pressure, he had reached the shop earlier on the fatal morning in order to get out a larger amount of metal than usual. In the best of health and spirits and fired with enthusiasm in his work, he endeavored to save for his company what metal remained in a leaking pot. In fact so great was his zeal that he totally overlooked the danger of bringing melted metal in contact with water. He skimmed the pot where the metal leaking out came in touch with an accumulation of moisture. An explosion resulted, which hurled not only a portion of the shop floor, but also a heavy piece of iron in such a manner that he was instantly killed. The danger in bringing water and melted metal together is so great and so well understood, that it is difficult to understand how any superintendent would tolerate having any water in the proximity of his casting shop, yet here was a case where the water was actually put there with a well defined purpose. In the days gone by as well as the present time every precaution was, and is taken to insure that all metal and materials used in connection with the melting of metals should be THOROUGHLY DRY.

Metal that has been stored out of doors and had an opportunity to become saturated or covered with moisture is carefully dried. Metal that has been recovered from ashes and sweepings by a wet process is dried by heating slowly and carefully. Any scrap that might contain water from washing operations is dried in an annealing furnace. In fact, water is shunned by the caster as he would the plague, yet here was a man deliberately working with death staring him in the face and he was too much engrossed in his work to realize it! We are not criticising the man, but we are criticising the desire to keep pace with the progress of the times which prompted him to lose sight of the danger, that under other and less hurried conditions he would have run away from. Just because it was believed that a few pounds of metal could be saved by skimming the crucible into water! Of course carelessness can be claimed as the cause of this man's death; but at the same time the water was there and thus was directly responsible.

Explosions may result from another source and that is, from the operation of "speltering" or introducing zinc into molten copper. When the copper has been melted, if the zinc is put into the crucible too rapidly, the union of the two metals is attended with violent action. The entire contents of the crucible may be thrown upwards out of the furnace and strike the operator on face, hands or body. The remedy for this, of course, is to introduce the zinc very gradually until it is all absorbed and then to stir the mixture easily and thoroughly.

THE MENACE TO HEALTH.

It is a matter of record that casters in common with foundry men in general are particularly susceptible to pneumonia and consumption. The cause for the prevalence of the first malady mentioned is the fact that the worker in a casting shop gets the body very much overheated and at the close of the day's work goes out of doors in the winter time without taking sufficient time to allow the system to get back to normal temperature. This is done even in shops where washrooms equipped with shower baths and other conveniences are supplied. The rapid changes in temperature together with the invariable use of stimulants, weakens the entire constitution and he falls an easy victim to the pneumonia germ.

A common and indefensible practice among workers in a brass casting shop is the custom handed down from generation to generation, of eating practically all the time the work is going on. Nearly every worker in the shop will be seen eating at any time during the day. After the "first round" of metal is poured in any large shop the men may be seen sitting around eating, with no regard for the dense smoke arising from the pourings of other "sets of fires" or "gangs" who are still at work on the round. The inhalation of the fumes of melted zinc gives rise to a malady known as "spelter shakes." The workers must necessarily absorb more or less of the spelter smoke with their food; in fact, in some cases the writer has seen meat cooked over a crucible that had just been poured and the fine white particles of zinc oxide could be seen clinging to the meat! The introduction of these fine particles into the bronchial tubes and lungs can only result finally in chronic bronchitis and in a good many cases consumption.

There is really no good reason why men in a casting shop should eat at irregular hours, any more than men engaged in other occupations or even at the same works. The men rolling hot metal or tending annealing furnaces get just as much overheated, but they have a regular time for eating. All that is necessary to successfully withstand the high temperatures and arduous labor is to keep the body in a state of moisture. This can be easily accomplished by drinking large quantities of water no cooler than 45 degs. Fahr. The practice of drinking ice water is very injurious as the drop in temperature is so great that it induces "cramps," which are well known to every brass melter and his helpers.

Another prevalent evil among casting shop workers is the taking of stimulants. This is a time-honored remedy for the "spelter shakes" or a species of ague caused by the poisoning of the system by spelter fumes. There is no doubt but that whiskey is a good remedy for an attack, but it certainly has no virtue as a preventive and the worker is a great deal better off without it. A far better practice is for the worker to be temperate, moderately, at least; eat only clean food in a clean and pure atmosphere, keep the body wet with perspiration and take a warm shower bath followed with fairly cold water and a complete change of clothing at the close of the day's work.

A NEW SOLUTION FOR COPPER PLATING.

To the Editor of THE METAL INDUSTRY:

I read in the January number of THE METAL INDUSTRY an article on acid copper solution by Chas. H. Procter; also one on how to keep an acid solution from streaking, by Royal F. Clark. For the past eight weeks I have been working on a solution to take the place of the acid copper.

I have been a polisher and plater for fifteen years, and have had charge of some good shops where they did copper, nickel and silver. I have charge of one at present and I have a nickel solution, an alkaline copper, and an acid copper; we have had no trouble with our solution on anything we do; our acid solution has always worked good, and has never streaked; but we have never been able to plate with a heavy copper on motor cycle cylinders and heads, as the flanges would plate so heavy and burn before the low deep places plated.

I am sending a sample of a piece of work plated in my new solution. I have plated in this solution pieces with holes and deep recesses in them, some as deep as three inches, and they all plate just as heavy as the nearest point at the anodes. It will not plate by simply immersing the article in the solution, and takes but very little current to plate with. It has no streaky deposits, and will plate as heavy as wanted, and will plate as heavy as an acid copper in the same time with no bad results; it will also plate on zinc, aluminum, or any other "hard to plate" metals, and the nickel that is plated over it will be as white and clean as silver nickel.

This piece of work I am sending you was only in the solution fifteen minutes, and you see how clear and even the plate is; this was done over common black iron polished just enough to get the roughness out. What I would like to have you tell me is, can I patent or sell the receipt to anyone, and do you know of anyone I could interest? I am willing to do any piece of work they send me to show that my solution is a good one.

I wish you would call attention to the fact also, that I will give a demonstration of this solution to any who are willing to come to Owego, who are interested and have had trouble with a copper solution, and want a heavy plating copper that will plate in ten hours no more uneven than this sample that I am sending you. Also that the chemicals used are inexpensive, costing less than half what an acid copper bath costs. I also claim that it will plate any metal or metals, made out of iron, steel, brass, copper, zinc, aluminum, pewter, solder, lead or tin.

CHAS. F. LUCE.

Owego, New York, March 29, 1910.

The sample of copper plated steel mentioned by Mr. Luce is on exhibition at the office of THE METAL INDUSTRY, 99 John street, New York, where it can be examined by anyone interested.—ED.

FAILURE OF BRASS LOCO-TUBES.

To the Editor of THE METAL INDUSTRY:

With reference to my paper on the "Failure of Brass Loco-Tubes," which appeared in your February issue, your reporter has announced that I replied to the discussion, whereas I only briefly alluded to one or two points, because of the lateness of the hour, and that other important papers had not been read. I stated that I would fully reply in writing. Such being the case, I have no doubt you will be good enough to insert the following statements, as the criticisms already made are likely to be misunderstood.

In the first place, most of the speakers expressed the opinion that the breakdown in the tubes I examined was due to erosion caused by solid particles in the blast. This is negatived by the fact that tubes of the same make had an average life of three to four years before the untreated Birmingham water supply was used in the boilers. As soon as the new feed water was injected into the boilers, the average life of the same make of tubes dropped from eight to twelve months, causing frequent casualties and government inquiries.

In the second place, before the tubes were submitted to me, the boilers were examined by experienced locomotive engineers, and they came to the conclusion that the ordinary cause of failure referred to by my criticisers did not hold good in this case.

In the third place, the tube that was handed around for inspec-

tion was one removed from the boiler when breaking up the locomotive from which the tubes I examined and reported upon were taken. It was handed around to the members assembled in order to show the color and nature of the scale only.

Should any of your readers be aware of any examples where thin films of scale, of the nature referred to in my paper, have caused collapse of brass loco-tubes, it would be of great interest if they could spare time to communicate such examples to your journal. T. VAUGHAN HUGHES.

130 Edmund street, Birmingham, March 8, 1910.

CORRECT PRICES FOR INGOT METALS.

To the Editor of THE METAL INDUSTRY:

We would like to ask an explanation in regard to the quotations that appear every month in your valued journal. We note, for instance, in your prices of Feb. 11, yellow brass ingots, 9-10c. red brass ingots, 12-13c., bronze ingots, 11-12c. In the same list you quote casting copper at 13.5, lead at 4.75, zinc at 6.25, and tin at 32.50.

With these metal prices we are unable to figure compositions of bronze or brass in which the price of the metals alone does not exceed the price of the alloy. In addition there would be no room for cost and loss of melting, etc.—METAL.

The prices quoted in THE METAL INDUSTRY as referred to above are not the prices of ingot metals made exclusively from new metals. The ingot metals are made mostly from old metals refined with certain additions of new metals. We give in each case the range of price from the highest to the lowest. The price of ingot varies with the proportion of the different elements which make up this ingot. It is a known fact, and it needs no proof, that if the price of ingot metal was as high as the price of the metals alone which enter into the alloy there would be no inducement for the consumer to purchase ingot metal, and the ingot metal dealer would soon be out of business.

If our correspondent will get into communication with ingot metal dealers they will furnish him ingot metals at the price we quote, and will also furnish him the analysis and so prove to him that the prices which we give in our journal are absolutely correct.—ED.

HARDENING COPPER.

To the Editor of THE METAL INDUSTRY:

If you will make two copper chisels out of pure copper and send them to me I will temper them so hard that you can cut the hardest kind of wood without turning the edge. There is money in this for both of us and if you are interested in this proposition I shall be pleased to call and talk it over and also show you some documents that I have in my possession which I think would convince you of the sincerity of my statements.

CHAS. LUDLOW.

Keansburg, N. J., April 9, 1910.

(Should any of our readers care to take up with this proposition, we are sure Mr. Ludlow will be glad to exhibit his process.—Ed.)

SHOULD A POLISHER SIT OR STAND WHILE WORKING?

To THE EDITOR OF THE METAL INDUSTRY:

I would be pleased to receive whatever information can be gathered through your paper from the different manufacturers that do polishing, as to whether or not they think that their employees can get out more work in the polishing room while sitting on a stool or while standing. It is my opinion there can be much more work if the employees stand while doing this work than it is possible for them to do if they are sitting on a stool while doing the work. F. H. SCHUTZ.

Decatur, Ill., April 9, 1910

THE METAL INDUSTRY would be pleased to hear from any of its readers on this question.—ED.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

CASTING

I have noticed several times in your valued paper where it stated that small aluminum castings could be made in chilled molds with very good results.

I should like very much to try the experiment of making aluminum castings in chilled molds and thought perhaps you might be able to explain through the columns of your paper just what the material should be that is used for making the molds and also how the molds should be made to get the best results.

A.—Chilled molds of cast iron, brass or aluminum are often used in making small aluminum castings, the action of the mold being to rapidly convey away the heat from the molten metal and give the castings a fine grain. Castings made in chill molds are thus stronger than sand castings. Care should be taken not to have the molds nor the metal too hot, as overheating lessens the fluidity of the metal. The gates should be rather high so as to bring considerable pressure on the mold and give castings with sharp outsides.—J. L. J.

DRAWING

Q.—In drawing cartridge brass, at say 50 or 60 shells per minute, is the heat generated apt to become troublesome, and at about what thickness of metal can you dispense with the pressure on the blank in shallow drawn work? Why are not toggle jointed presses used for blank and draw operations, also what is the best lubricant to use for drawing operations on brass?

A.—If you mean small-arms cartridges, there is no trouble in heating the tools and material at fifty or sixty strokes of the press per minute. If you mean rapid-fire cartridges for cannon, say above 1 inch in diameter, the speed should be somewhat slower. On 3-inch cases the strokes are usually from 20 to 30 per minute, varying more or less with circumstances.

The exact point at which a blank holder can be dispensed with and a single-action press used can best be determined by experimenting. If the dies are made the right shape, cups which are about two-thirds of their diameter in depth can be drawn single-action if the metal is 1/16 inch as thick as the diameter. There is, however, no positive rule about this, the thinner the metal in proportion to the diameter and depth, the more likely it is that the double-action presses for holding the blank from wrinkling would be required.

In such cases as double-action presses are necessary, the so-called toggle-joint type would answer the purpose, but the cam-actuated type is generally used because it is simpler and answers the purpose just as well.

Various lubricants are used for drawing brass from plain soap suds up to various mixtures of the same with whale oil and other greasy lubricants. Various special preparations for the lubrication of drawing dies can be furnished by dealers in oils and such supplies. Among these there is one, we believe, called "Drawline." In many cases soap suds are good enough.

DEPOSITING

Q.—What is the best method of producing silver deposit on glass?

A.—Make a paint of the ingredients given below and after

painting the articles burn them in a regular kiln that is used by china decorators.

Silver (reduced to a fine powder)	4	parts
Sugar of lead (lead acetate)	1	part
Borax	1	"
Cream of tartar	1	"

Mix with a fat oil and thin out with turpentine.—G. B. H.

FINISHING

Q.—Will you publish a formula for producing the green verde finish as shown on the sample of iron chain sent you?

A.—The finish on the section of iron chain is known as verde. This is not an acid verde, but an applied green. To produce the finish proceed as follows: Copper plate and oxidize the chain with a cold liver of sulphur dip, 1 oz. to the gallon of water, then dry out and lacquer the chain, then mix up some dry carbonate of copper with just a little chrome green added with lacquer and stipple on the chain with a small painter's sash brush. The copper lacquer should be very thin so as to prevent a painted appearance.—C. H. P.

HARDENING

Q.—Is there an agent to harden tin without adding other alloys?

A.—Adding 1 to 2 per cent. of lead or copper will harden tin, but these and other foreign metals diminish its luster. The purer the tin, the brighter will be its surface.—J. L. J.

MOLDING

Q.—Kindly give us a formula for wax mixture in making wax patterns.

A.—For making wax patterns some use pure beeswax—2 parts of wax to one of rosin. Others ozokerite with a small quantity of Venice turpentine or kerosene to prevent it from shrinking. The two above mixed together also gives good work.—D. J. L.

PLATING

Q.—My nickel plating solution plates very dark. Some glue got into it, and I think this is the cause of the trouble. Am I right?

A.—A small amount of glue should not affect your solution very much. Your trouble is probably due to a deficiency of metal in solution or a poor conductivity. Try the effect of adding about 3 ozs. of common salt to each gallon of solution. If this does not produce a whiter deposit, then metal is needed. It would then be advisable to add about 2 ozs. of single sulphate of nickel to each gallon of solution. The solution should register 5½ to 6 degrees Baume.—C. H. P.

Q.—1. What benefit is sweet spirit of nitre in the formula for nickel solution?

2. What is a good formula for brass plating solution for large iron castings, 5 to 20 lbs., to get a good yellow color?

3. What is a good composition for brass anodes to secure a yellow color?

A.—1. Sweet spirits of nitre are of no advantage in a nickel solution; any of the nitrate combinations should be avoided.

2. A good brass formula for your purpose should consist of water, 1 gal.; cyanide of potassium, 6 ozs.; carbonate of copper, 3 ozs.; carbonate of zinc, ¾ oz.; water ammonia, 26 per cent., ¼ oz.

3. The composition known as the 2 and 1 mixture, which consists of 66 parts of copper and 34 parts of spelter, either in the form of rolled or cast anodes.—C. H. P.

Q.—What is the best method for silver plating knives and forks? I have been copper plating light before silvering, but sometimes the silver peels off.

A.—The best method to pursue in silver plating steel knives and forks is to boil them out well after polishing; scour with pumice stone and tampico brush, then allow to stand in soda water until ready for plating. After wiring or framing up, wash well, run through a muriatic acid dip (this should be fairly strong), rewash and pass through a clean cold potash solution, that should be only used for this purpose; rewash the articles, then use two silver strikes before placing in the regular bath. The first should consist of about 2 dwt. of chloride of silver and 1½ lbs. of cyanide to each gallon of water. A very small silver anode should be used in connection with a copper one about half a dozen times as large; this is only for a flash, just a visible film should be noted. The second strike should consist of:

Water	1	gal.
Potassium cyanide	½	lb.
Chloride of silver	12	dwt.

The duration of this strike should be about two minutes; the knives should be moved constantly to avoid burning. Then the knives should go to the regular bath for the finished deposit. —C. H. P.

TINNING

Q.—Where can I get the purest and whitest tin?

A.—All the good grades of Strait's tin are practically chemically pure and equally white.—J. L. J.

Q.—Will it pay to refine tin foil, also what is the process?

A.—Tin foil may contain 30 per cent. or more of tin or it may be simply lead foil surfaced with tin. Whether it would be profitable to run it down and refine it would depend on its quality and what you had to pay for it. Before melting it would be best to get it into the form of balls, so that less surface would be exposed to oxidation and the melting loss thus kept down. The metal could be refined by poling with hickory poles and then the amount of tin and lead determined by means of the well known Richard's Balance.—J. L. J.

Q.—Will adding silver to tin in a hot galvanizing process add to the retaining of luster, if so what proportion?

A.—Silver tarnishes more readily than tin, so there would be nothing gained by using small amounts of it in the hot tinning process. Even if its use were advantageous the high cost of silver would prevent its use commercially—J. L. J.

Q.—Is there anything better than muriatic acid to eat rust from iron and steel before tinning?

A.—Sulphuric acid is more generally used for pickling iron and steel than muriatic acid as it is less expensive. For sandy articles, hydrofluoric acid is good. Just before tinning the articles they are dipped in dilute muriatic acid to remove the small amount of rust that may have formed subsequent to pickling.—J. L. J.

STRIPPING

Q.—Can silver electroplate be stripped from brass and steel without attacking subjacent metal, by a cold process of acid.

A.—Silver may be removed from steel articles by placing them in hot, strong sulphuric acid in iron kettles. Dilute sulphuric acid will effect a separation of silver from brass (copper and zinc) the copper and zinc dissolving and the silver not being acted upon.—J. L. J.

Q.—Kindly give me a formula for stripping gold and silver class pins, etc., preparatory for enameling or polishing, that will not injure German silver joints and catches.

A.—The following formula is probably what you require:

Yellow prussiate of potash	8	ozs.
Cyanide of potassium	2	"
Water	1	gal.

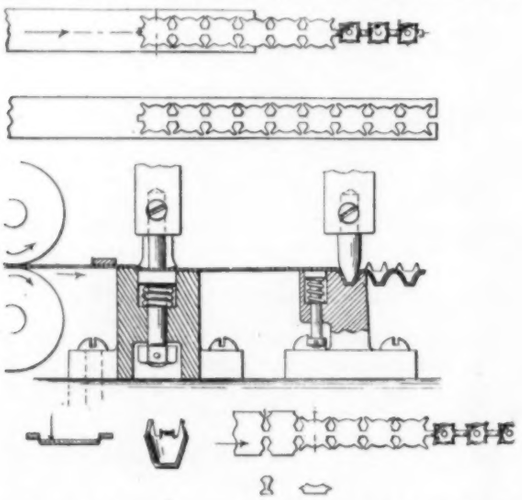
Arrange as for a plating bath only use a reverse current. The articles become the anode and if an iron tank is used the tank becomes the cathode; otherwise use iron or carbon anodes. Agitate the articles while removing the fire scale. A strong current is necessary, not less than 6 volts (8 or 10 give better results). The articles should come from the bath bright and clean.—C. H. P.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

950,524. March 1, 1910. Method of Manufacturing Strips of Continuously-Connected Gem Settings. W. Whytock, Jr., Providence, R. I.

In the production of strips or continuous lengths of uniformly spaced gem-settings from bendable stock, as for example, thin rolled plate, it has been usual to employ two or more sets of cutters and punches for perforating and cutting away the waste stock in a step-by-step manner, thereby leaving the setting blanks united by narrow alining ties, the blanks being cupped or shaped by suitable tools working in unison with the punches, &c. An objection to such former processes is that the cost of production is comparatively large owing to the small and delicate punches and cutters necessarily required for perforating the stock, and also the added liability

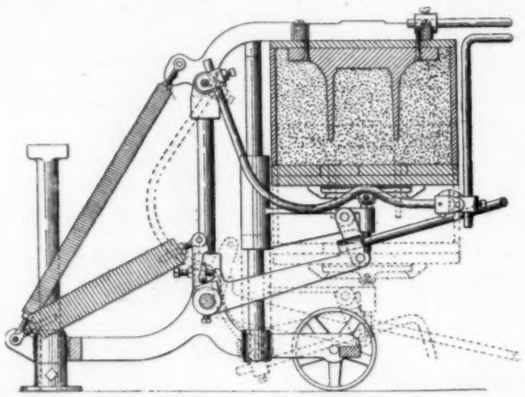


of breakage and repairs. Another inherent disadvantage is that the action of the tools in cutting away the waste stock produces and leaves a slight bur or roughness on the then underside of the outer edge of the blanks. In transforming the blanks into cupped or completely shaped product the said burred edges will then be found on the outer surface of the upper edge of the settings, thereby materially affecting the finish, appearance and value of the product.

The objects which this patent has in view are to completely overcome the disadvantages just referred to. To that end the improvement consists in cutting by means of the machine shown in cut the connecting blanks from the stock, the waste being simply two continuous marginal strips, thereby leaving the bur, usually present in any cutting and punching operation of this class, on the upper edge of the blanks. In transforming the latter into the connected cup-shaped settings by the shaping die or tools the burred edges will lie on the inner or unexposed surfaces of the upper edges of the product, thus presenting a smooth and finished appearance, the tools employed being strong and durable.

950,558. March 1, 1910. Molding-Machine. Henry C. Pridmore, Chicago, Ill.

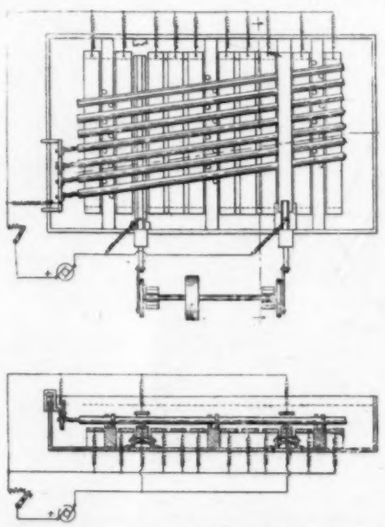
A rock-over molding machine of simple construction and adapted to automatically adjust itself to various sized flasks. As shown in the cut, a flask carrier or receiving device is suitably mounted upon the frame. Means is provided so that the space between the pattern carrier and the flask receiving device will be automatically adjusted to compensate for different sized flasks. The flask receiving device comprises two projecting parts which are movably mounted upon a suitable supporting device so that they may be automatically moved up or down. The flask receiving device is provided with engaging parts which movably engage guides, the arrangement being such that the engaging parts slide up and down and along these guides to secure the proper adjustment. Means are provided for moving the parts relatively so as to draw the pattern. The flask receiving device is also connected with a controlling device by means of links. This controlling device



has two arms which are movably connected with the frame. These arms are connected with rotatably mounted shaft or rod which is mounted in bearings in the frame. This shaft is provided with an arm to which is connected a spring or counterbalancing device, the spring being connected at the other end to a stationary part. The springs are preferably made adjustable by means of screws at one or both ends, which fit into the screw-threaded end pieces with which the springs are connected. By moving the screws in or out the tension of the springs can be adjusted.

951,265. March 8, 1910. Means for Electroplating Pipe, Etc. L. A. Williams, Evanston, Ill. Assignor to D. H. Murphy, New Castle, Penna.

In electroplating rods or pipe it has been customary to



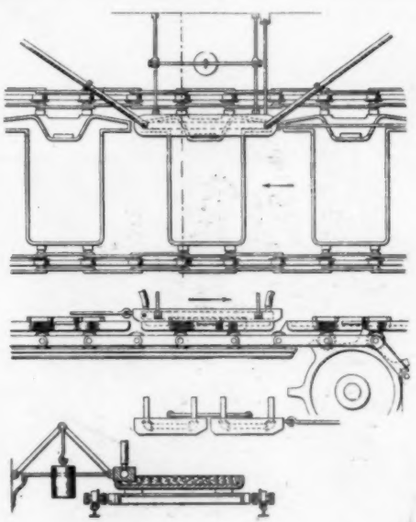
move them continuously or reciprocally in the solution. In order to prevent the unequal deposit of the material used an auxiliary apparatus has been employed. The device shown in

the cut dispenses with this auxiliary apparatus and produces the same result.

By this invention the means used to impart reciprocating motion to the rods or pipe, and the means used to prevent or limit lateral displacement of the rods or pipe in the tank, coöperate in such a manner as to produce reciprocating longitudinal motion of the rods or pipe in the plating tank.

951,299. March 8, 1910. Casting Apparatus. D. W. Blair, Perth Amboy, N. J., and F. L. Autisell, New York.

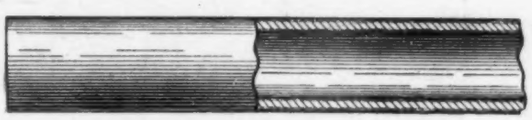
This patent covers an apparatus designed to simplify the production of anodes from fluid metal. This is accomplished by the machine shown in the cut in the following manner. In the case of an anode which has grooves or offsets, portions of the same at the place or places where its surface changes from one plane to another are subjected to a cooling action



sufficient to chill or set it quickly at such place or places, leaving the remainder of the metal to cool and set naturally and while it is traveling in a mold to a place provided for its discharge from the mold. In such case, moreover, the cooling device may not only serve to cool but also to produce the groove or offset in the metal. While this constitutes, perhaps, the most advantageous use of the present invention, yet its utility is not restricted to such use, for it may be advantageously employed, for example, to cool metal at the corners or other parts of the molds or particles formed in the molds, without itself producing any particular shape, relying upon the mold to give the metal the full shape required. While this cooling device may in any case be considered to be a part of the mold, yet for the sake of convenience it is termed a cooling device, and the means which carries the metal is designated a mold.

951,580. March 8, 1910. Coated Metallic Article. W. C. Robinson, Pittsburgh, Pa.

The invention is adapted to the coating of any metallic article which is subject to injury by alkalies and acids. It has been found of great value for the protection of iron and steel conduits for electrical conductors, and fittings used in con-



nection therewith. These conduits must often be placed in the walls of buildings and other structures made of cement or concrete compositions containing metallic cinder and slag from smelting furnaces. This cinder is very hard, and usually contains acids which are highly injurious to iron and steel. It is found that conduits coated as herein described are particularly serviceable in such situations; the coating is not injured by abrasion of such substances, and it efficiently protects the body of the conduit from pitting and corrosion.

In the practice of this invention the metallic article to be coated is first subjected to a treatment, whereby a metallic skin or coating is caused not only to adhere to the surface of the article, but to penetrate to a greater or less extent into the surface. Zinc is preferred for the metallic coating and can best be applied by the method known as "sherardizing," substantially as described in Letters Patents of the United States No. 701,298 and No. 829,386.

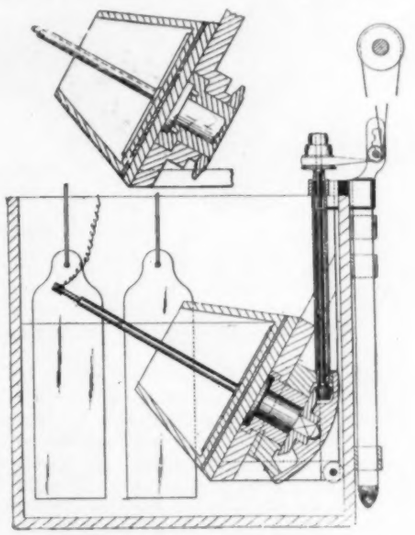
While zinc and other metals afford a highly efficient protection against the destructive action of alkalies, they are injuriously affected to a greater or less degree by contact with acids. Therefore, to the metallic coating above described, a second coating of an acid-resisting substance is applied, which is also of such character and applied in such manner as to not only form a coating, but also to penetrate to a material extent the initial metallic coating and the article itself.

This second coating is made of paraffin or wax, and may be so thin as to be sufficiently transparent to disclose the character of the underlying metal surface, and at the same time afford an efficient acid-proof coating. The accompanying drawing illustrates as well as it can be illustrated a section of pipe coated in accordance with the invention, the zinc and paraffin penetrating the surface of the article being indicated by the small dots.

951,662. March 8, 1910. Electroplating Barrel Apparatus. T. A. Smith and Thomas Diakin, Walsall, England.

The invention relates to an apparatus for effecting electrodeposition of metals of the type wherein a work-containing barrel, as shown in cut, is rotatable within a stationary tank containing the solution and the anodes, which barrel has its axis of rotation inclined, its upper end open, and its lower end substantially closed, the said open end lying below the level of the solution.

According to the invention, the inclined and rotatable barrel is supported within the tank either wholly or mainly at or



from its lower end only, so as to obtain a free flow of current from the anodes through said open upper end, and to permit the condition of the articles being plated to be easily examined without terminating the rotation of the barrel.

The mechanism for rotating the barrel is preferably located at the lower end of the barrel, in order that the upper end thereof may be open to the solution, as above stated. The barrel is readily detachable from its support without necessitating the dislocation of the support or of the driving gear, there being a detachable connection between the barrel and said gear. The barrel, the support and the driving gear form a unit which may be bodily removed from or placed in position within the tank.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

A TWO BELT POLISHING MACHINE.

Among the many varieties of devices for the mechanical polishing of metal articles, including bars, rods and tubing, the machine here illustrated stands out prominently as one of the most ingenious and successful so far produced. This machine is the invention of John C. Blevney, 216 High street, Newark, N. J. Mr. Blevney has spent three years in experimenting and has finally reached a high degree of perfection in his present machine.

While the machine was originally designed for the polishing of brass bedstead tubing, it was soon found that it had a much wider application, and is now being used for the polishing of all character of metal articles of iron, brass-copper, nickel, etc. The machine shown in fig. 1 is intended for the polishing of tubes and rods. With a change of table all kinds of flat articles may be polished.

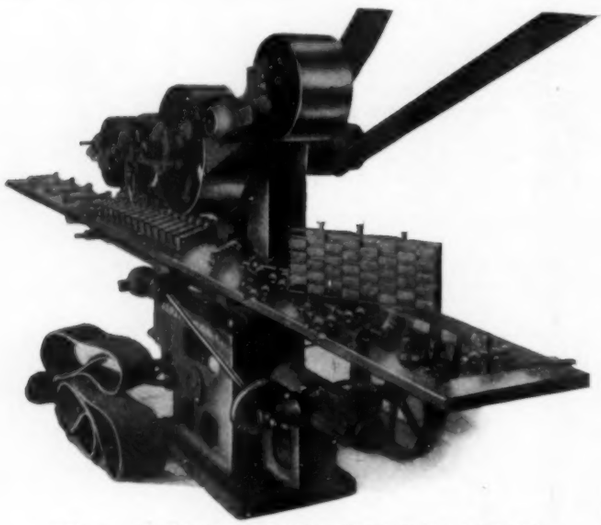


FIG. 1. BLEVNEY TWO-BELT POLISHING MACHINE.

The principle points of the machine are as follows: A corrugated cushion leather belt runs over the two lower pulleys as shown in cut Fig. 1, and an abrasive belt runs over this belt and over the upper pulley at a speed of 7,000 feet per minute. The belts are brought in contact with the tubes, which are fed on the tables in four lines on rubber covered rollers by dropping a platen, by means of a lever. The platen is built up in the form of a frame, having a series of independent acting weights. These weights may be increased by additional weights, which are so adjusted that they fit to the first weights. The platen, weights and extra weights, as well as the method of guiding the weights, is shown in Fig. 1 by the parts on the front of the table.

The roller feed shafts are built up of rods provided with properly spaced rubber covered pulleys. Those shown placed in the machine are spaced for tubes or rods varying from one inch up to ⅜ inch, and can be so spaced as to accommodate up to three inches. The platen as constructed causes the finishing belt to follow the irregularities of the tubes. The corrugated cushion belt provides also a clearance of chips caused by grinding. The greater speed of the grinding or polishing belt in its relation to the cushion belt causes the cushion belt to lay in the corrugations and so carries the chips.

In setting up the machine the tubes are placed in the proper roller shafts, the table is raised to bring the tubes to within ⅛ inch of the belts, while the platen is raised. The feed belt is placed on the proper cone slip of the feed pulley, and the platen is dropped by the small lever above it and the tubes are carried through by the friction between them and the surface of the abrasive belt. Proper tension of the belts is regulated by the weight levers, and the horizontal position of these levers is secured by sliding pawls on their shafts. Alignment of the belts is had by the hand screws next to the pulleys.

On 1 inch tubes taking three cuts to finish, each at the rate of 35 feet per minute and each with the proper grade of abrasive belt, gives a finishing capacity of 12 feet per minute. One boy

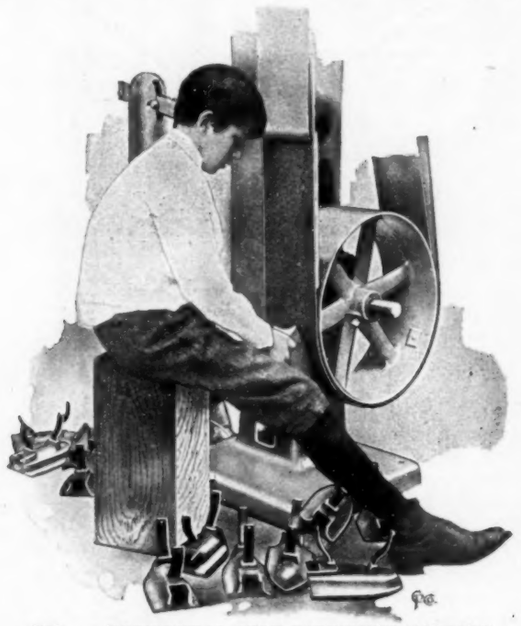


FIG. 2. HORIZONTAL BELT POLISHING MACHINE.

can feed and another take the tubes from the machine, thus cutting the labor expense to an enormous degree. The above will produce a velvet finish; to color the table is set at a slight angle and a rouge belt is used.

This machine is also built in a horizontal form for polishing irregular shaped articles and is shown in this form in Fig. 2. In Fig. 3 we show the manner of making the abrasive belt. The

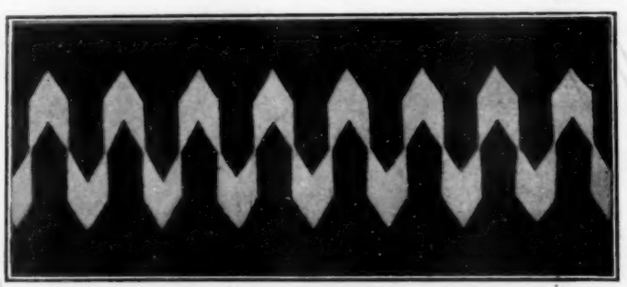


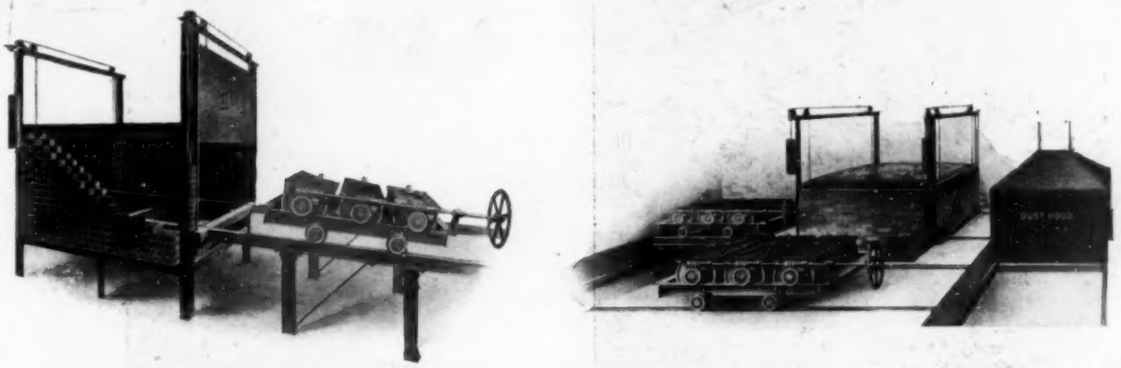
FIG. 3. SHOWING METHOD OF JOINING POLISHING BELT.

ends are stamped out by a die and then glued together by means of a press, which makes the joint really stronger than the original belt. These belts are made with any grade of abrasive, from coarse emery to the finest polishing rouge. Additional information concerning these machines, prices, etc., can be obtained by corresponding with John C. Blevney, 216 High street, Newark, N. J.

AUTOMATIC SHERARDIZING APPARATUS.

Ever since the Globe Machine & Stamping Company, of Cleveland, Ohio, established the first commercial sherardizing plant in this country and began the manufacture of sherardizing equipment it has been recognized that the success of the progress and its application on the largest scale were largely dependent upon the reduction of the time factor and upon making it a continuous process which would be in operation, without additional labor, every one of the twenty-four hours.

By the use of the equipment shown in the accompanying illustration, the Globe people claim to reduce the treatment time for sherardizing to six hours per heat while at the same time, they have improved the quality of the work and have enabled manufacturers to run four heats a day without adding to the necessary day force of two men.



AUTOMATIC SHERARDIZING APPARATUS OF THE GLOBE MACHINE AND STAMPING COMPANY.

The equipment units may be described as consisting of one oven, four sherardizing machines and two transfer cars with necessary tracks forming a rectangle, and having a short spur of track which is not shown in the cut, but which extends at a right angle to the pit at the right.

The sherardizing machines consist of three drums mounted upon a car. Each drum has a gear at one end. These gears engage worms on a shaft which has a sprocket at one end. When the machine is within the oven the sprocket is outside, and is revolved by power at about one revolution per minute. All the time the machine is in the oven the separate drums are turning over and over, thus bringing fresh zinc dust into contact with the articles treated and enabling the contents of the drum to become heated in much less time than if they were stationary. This quicker heating is due to the fact that as the zinc dust is a poor conductor, the revolving brings all the dust to the drum surfaces in turn to be heated instead of compelling the heat to force its way to the center of the drums. In the picture showing the machine and oven, we may suppose that a third machine is in the oven and a fourth under the dust hood. The machine under the hood has just been emptied by removing the tops of the drums and turning the drums part way around. The hood keeps the zinc dust from escaping into the shop. In a few minutes the operators will shovel the treated articles off the screen that caught them. The dust will be below the screen ready to put into another machine.

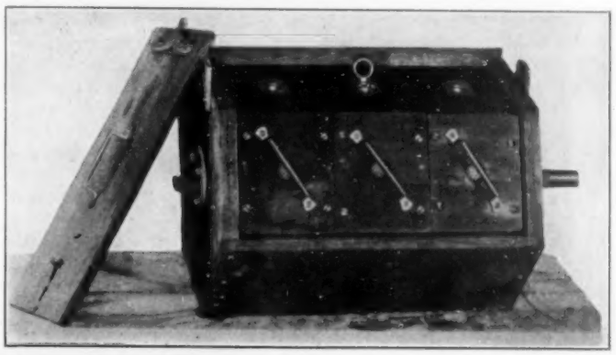
The plant operates as follows: Starting with four empty machines, the two laborers load one with material and zinc dust and shove it into the oven. They load a second one and shove it out onto the spur track. This takes most of the morning. At noon the first machine put into the oven is ready to take out. It is run out at the left to cool. The second machine loaded, the one on the spur, goes into the oven. The men now load the third machine and run it onto the spur and then load the fourth and leave it over the pit. This completes their day. But the second machine, put in at noon, is ready to run out at six o'clock. The machine first taken out is moved, the second one takes its place. At midnight the watchman runs out the third machine and runs the fourth into the oven. In the morning the day men find two machines cool enough to empty and fill and they start the cycle over again.

The sherardizing machine drums will hold each about four kegs of such things as bolts, washers, screws, etc., and three kegs of zinc dust. The labor required can be easily done by two men. The ovens can be heated by gas or oil. The erection of the oven and tracks and the assembling of the machines and transfer cars can be done by ordinary shop labor.

POLISHING TANK OR TUBBING MACHINE.

The cut here shown represents the new inner polishing barrel of a tubbing machine which is claimed by the manufacturers to be a great labor-saving device. It will do the work of five or six ordinary hands, polishing or burnishing in a workmanlike manner. Chains, collar buttons, stick pins, beauty pins, rings, charms, safety fob fasteners, hat pins and other kinds of jewelry can be polished or burnished in this machine. It does not matter whether it be gold, silver, plate, nickel or brass, the articles above can be polished or burnished, a number of gross at a time, leaving them finished, all ready to card or ship; and, if desired after electro-plating, return to the machine and run for five or ten minutes, which will make your finish last longer and will also put as little or as must gloss on same as may be desired. This machine is made in a first-class manner as to fittings and material used in construction; runs about forty revolutions per minute from main shaft, if desired.

The tubbing machine occupies a floor space of 20 inches wide, 28 inches long and 36 inches high, and its weight is 150 pounds. The following simple and concise directions are given for its operation: Fill with water to bottom of shaft. Always keep water in tank, and inner tub in same. Steel balls, fig soap and a little ammonia are all that is needed for use with this machine. The machine is manufactured by Smith & Richardson, Attleboro, Mass., who will be glad to quote prices and send pamphlet "M" upon application."

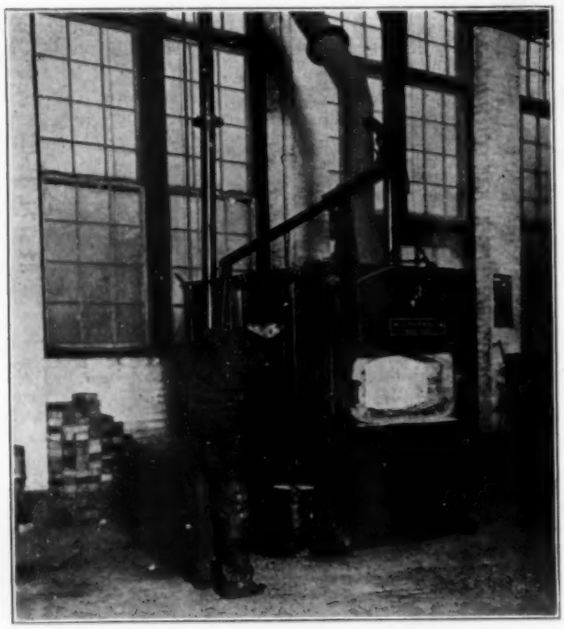


NEW INNER POLISHING BARREL FOR TUBBING MACHINE.

THE ORIGINAL ROCKWELL REVERBERATORY MELTING FURNACE.

The W. S. Rockwell Furnace Company have recently put upon the market the scrap reducing furnace shown in the cut. This furnace is suitable for reducing wire and miscellaneous scrap to ingot shape, melting large material without reducing to crucible size, and for melti g large quantities of metal for castings which are too large for the ordinary melting furnace and which cannot be economically melted in a cupola.

The furnace is designed for either oil or gas fuel. If oil is used air at from 12 ounces to 2 pounds pressure is suitable, the fuel and air being introduced through the burners on each side of the furnace. No chimney is required. A hood placed over



W. S. ROCKWELL REVERBORATORY FURNACE.

the furnace is sufficient to carry off the spent gases of combustion and fumes from the metal. The charging opening is amply large so that there is no labor wasted in reducing scrap to small sizes, and with the speed, low fuel consumption and saving of labor the furnace will pay for itself and net the manufacturer a greater return for the scrap metal in ingot form.

The furnace is run for about 30 minutes before charging to get it hot. The metal is then charged through the large door on the front as fast as the heated condition of the furnace will permit. When melted it is drawn off by the spout on the side of the furnace, as in a cupola, the impurities such as iron, slag, etc., remaining at the top and are removed either by skimming or drawn off with the last heat. The door is lined with fire brick, protected from the heat and clamped tight against the front.

A small opening is provided on the side for stirring, skimming or observing the condition of the metal and is protected by a brick lined lift door and cast iron plates on the front.

This furnace is built in ½, 1, 2½, 5, 10 and 15 ton sizes with ample overload for each size.

GOOD TASTE AND ECONOMY IN AUTOMOBILE LAMPS.

The Eureka Pneumatic Spray Company, 1276 Spring street, New York, are sending out the following announcement:

The tendency in all matters pertaining to automobiles, taxicabs, etc., at the present time is to get away from flashy colors and circus band-wagon trimmings and make a dressy looking car, with its trimmings corresponding, using the good taste of being inconspicuous, such as a well-bred person uses in his dress. The brass lamps are not only too showy, but require constant cleaning. They will not stand exposure around salt air, and may be splashed with mud five minutes after being used and require repolishing.

We have recently installed outfits in four automobile lamp factories for finishing lamps in black, both with the rubber glossy finish and high luster. We are now prepared to finish lamps for garages, private owners and taxicab companies, giving a finish which will stand all conditions and require no more cleaning than to turn the hose on it and wash off the mud. When sending lamps to be refinished the oil should be taken out and the lamp cleaned.

NEW POLISHING LATHE.

The Diamond Machine Company of Providence, R. I., has recently developed a new type of polishing machine, shown in cut, which meets the growing demand for a polisher that can be belted from below the floor. The pulleys are protected by a

DIAMOND MACHINE COMPANY'S NEW POLISHING LATHE.

cover, but if desired this can be removed and the machine belted from an overhead countershaft. The height of the spindle above the floor is 38 inches, and the total floor space required 33½ x 54 inches. Wheels up to 16 inches can be easily swung.

IMPROVED CALIBRATING APPARATUS FOR HYDRAULIC AND OTHER HIGH PRESSURE GAUGES.

The bursting of machine parts and fittings from excessive fluid pressure is usually accomplished by considerable danger, expense and delays for repairs. This is especially true with the extremely high working pressures under which liquids and air are often used. It is therefore quite important to know the pressure conditions within any apparatus using these sources of power, and for this reason the gauges should be calibrated at regular intervals. Under the higher hydraulic pressures, it is frequently the case that the same gauge will show different percentages of error at different pressure readings, and these can be compensated for in ascertaining the true pressure only by comparing with a "master" gauge of known accuracy or by loading with a known pressure.

For the above purpose an apparatus has been designed by the Watson Stillman Company, of New York. The apparatus consists principally of a stand to which is fitted a cross made of hydraulic bronze. A gauge being tested, which may register any pressures up to 16,000 pounds per square inch, and the master, are attached to the front and back ends of the cross respectively.

For testing the master gauge, a special weight-loaded hardened and ground steel piston and cylinder are attached at the right by means of flexible copper tubing. These parts are cut out by a stop valve when not testing the master guage.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

THE FOUNDRY AND MANUFACTURERS' SUPPLY ASSOCIATION.

President, F. N. Perkins, Freeport, Ill.; Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill.; Treasurer, J. S. McCormick, J. S. McCormick Co., Pittsburg, Pa. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the Association are for the commercial and technical education of iron and metal industries by co-operating with all foundry and manufacturing interests in making an annual exhibit of supplies and equipments in conjunction with the meeting of the American Foundrymen's Association. The next exhibit and convention will be held in Detroit, Mich., June 6-10, 1910.

Secretary Hoyt is now busy assigning space to intending exhibitors at the coming convention in Detroit. He says in this connection in a circular just sent out:

"The interest in the exhibit this year far surpasses that of any previous year, and to date we have had applications for more than 30,000 sq. ft. of space, and the promising inquiries we have received make it altogether probable that we shall soon have double the space used at Cincinnati last year, and a record breaking show is assured. We urge all members to use every possible means for advertising this fact, that we may have a record breaking attendance as well.

"If you have not already made application for space, do so at once, as we have but a small amount left, and we are sure that if you do not take space you will regret it when you arrive at Detroit next June. Even if you do not care to make an exhibit, you will want enough space for headquarters at least. We propose to publish a complete directory from which visitors may ascertain your location and names of representatives at the convention."

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

President, Theo. Ahrens, Louisville, Ky.; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1112 Schiller Theater Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City in December of each year. The Semi-Annual Meeting is generally held at Atlantic City or some other Sea Coast town. The next meeting will be held in Atlantic City, N. J., on June 21 and 22.

Commissioner Webster reports that the spring meeting held at the Hollenden Hotel in Cleveland, on March 17 and 18, was unusually well attended. A number of new members were enrolled, and the manufacturers reaffirmed their allegiance to the action taken at the previous meeting held in New York in reference to establishing a uniform center of 7½ inches on all styles of bath cocks with ball off-set couplings, when the bath cocks have a shank measurement of 3⅜ inches center to center and no standard or spread being recognized for other styles or kinds of off-set couplings, takes them in a category of special goods and, when furnished, to be charged for accordingly.

The reports of officers were received, and the Association adjourned to meet in Atlantic City, N. J., on June 21 and 22.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Chas. H. Proctor, Arlington, N. J.; Treasurer, Nathan S. Emery, New York, N. Y.; Secretary pro tem., Percy S. Brown. All correspondence should be addressed to the Secretary, P. S. Brown, 956 Anderson avenue, New York. The objects of the Association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets the first Saturday of each month, 8 p. m., at the Hotel Chelsea, 222 West Twenty-third street, New York City.

The fourteenth regular meeting of the National Electroplaters' Association was called to order by the President, Charles H. Proctor, at the Hotel Chelsea, New York City, on April 2, at 8:20 p. m.

The Secretary read letters and communications from various members, as well as a letter from Dr. Richard Moldenke, stating that he had sent to the Association copies of the Transactions of the American Foundrymen's Association and the American Brass Founders' Association, and inviting the Association to participate in the convention to be held at Detroit in June. The Secretary stated that he had thanked Dr. Moldenke in the name of the Association and had advised him that it will not be practicable for the N. E. P. A. to join them this year. L. H. O'Donnell was elected to active membership.

The matter of constitution was then taken up, and after considerable discussion the revised constitution as published in THE METAL INDUSTRY for March was adopted, with one or two minor corrections. This constitution went into effect at once and the election which followed was governed by it. The following officers were elected: President, Charles H. Proctor; Corresponding and Financial Secretary, George B. Hogaboom; Recording Secretary, Royal S. Clark; Treasurer, H. H. Reamar; Librarian, August Hoffman. Vice-Presidents, New York, Justus A. Stremel, New York, N. Y.; New Jersey, Hugh Baxter, East Orange, N. J.; Connecticut, J. W. Slattery, Norwich, Conn.; New England, O. A. Hillman, Attleboro, Mass.; Illinois, Michigan, etc., J. P. Flanigan, Detroit, Mich.; Pennsylvania, F. C. Clunart, Philadelphia, Pa. Board of Trustees, William Schneider, Chairman, and Messrs. Brown, Mullard, Steihle and Newton. Sergeant-at-Arms, R. H. Elder, and Assistant Sergeant, W. Fisher.

At the next meeting, to be held May 7, all these officers will be installed, and as it is the annual convention meeting, some interesting papers will be read, and a full attendance is desired.

AMERICAN SOCIETY FOR TESTING MATERIALS.

A committee appointed by this society to formulate standard specifications for non-ferrous metals and alloys, held a meeting recently in New York City. Dr. Wm. Campbell, of Columbia University, was elected chairman, and he now announces the following sub-committees.

1. On Pure Metals in Ingot Form—W. H. Bassett, chairman; L. Addicks, F. L. Antisell, G. H. Clamer, T. D. Lynch, G. C. Stone.

2. On Wrought Metals and Alloys—W. R. Webster, chairman; J. A. Capp, W. H. Bassett, N. F. Harriman, T. D. Lynch, H. E. Smith.

3. On Sand Cast Metals and Alloys—T. D. Lynch, chairman; G. H. Clamer, G. L. Norris, C. R. Spare, E. S. Sperry, H. Souther.

4. White Metals—Tin, Lead or Zinc Base—G. H. Clamer, chairman; L. J. Krom, E. S. Sperry, G. W. Thompson, H. Souther, H. E. Smith.

ITEMS OF INTEREST TO THE INDIVIDUAL.

JOSEPH SCHILLING.

JOSEPH SCHILLING.

Joseph Schilling, the new general manager of Russell & Erwin Manufacturing Company, manufacturers of builders' hardware, New Britain, Conn., was born in Prussia, Germany, and came to the United States at the age of 17. He located in New Britain and learned the brass molding trade at the factory of P. & F. Corbin, and from then on he devoted his entire time to foundry problems, which trade he was deeply interested in, and was very successful in making many improvements in the methods employed at that day. Twenty years were spent with P. & F. Corbin, and in 1889 he left their employ and entered the Russell & Erwin Manufacturing Company as foreman of their brass foundry. On November 26, 1906, he was made general superintendent and superintendent of foundries. This position he held until 1909, when he assumed the responsibilities of the general managership along with his other duties.

Mr. Schilling is one of the oldest foundrymen in this country, and his experience has been of a widely diversified nature, and has covered every phase of foundry work. Mr. Schilling is a member of the Executive Committee of the New England Foundrymen's Association, and so during his whole career has devoted himself entirely to foundry matters in both the brass and iron foundries.

His success in his chosen line has been due to his conscientiousness in his personal attention to such matters as required his careful and thorough consideration. He is in every sense of the word a self-made man, and his having reached and being able to enjoy the position of head of one of the largest hardware manufacturing concerns in the country is due to his integrity of purpose, which has made for him friends with all those who have been fortunate enough to enjoy his acquaintance.

HENRY G. VOIGHT.

HENRY G. VOIGHT.

Henry G. Voight, the assistant superintendent, was born in New Britain, Connecticut, January 19, 1867. He received a common school education in the public schools, and was apprenticed to the pattern making trade in 1882. He was appointed in 1890 foreman of the pattern department in Russell & Erwin Manufacturing Company. A few years later he was given charge of the tool, chasing stock, food cutter and door check departments in addition to the position he already held. In 1907 he was appointed as superintendent of design and construction, in which position his work was of great service, especially in the inventive lines. At present he is, as stated, assistant general superintendent and in direct charge of the production of goods and the production of new lines and of all matters pertaining to patent work.

Very soon after serving his apprenticeship in the pattern department he developed an inventive faculty and this has been exercised throughout his career. He has taken out more than one hundred and seventy-five different patents covering articles of builders' hardware, household appliances and moulding machines and accessories. He is a member of the American Society of Mechanical Engineers.

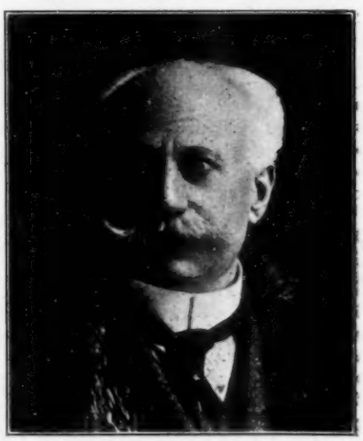
Jos. H. Hansjosten, employed as foreman plater and polisher of the Rock Island Stove Company, at Rock Island, Ill., has resigned his position to take charge of the plating and polishing department of the Automatic Electric Company, of Chicago, Ill.

Percy Longmuir, consulting metallurgist, has joined the permanent staff of Samuel Fox & Company, Ltd., Stockbridge Works, Sheffield, England, in the capacity of chief metallurgist and superintendent of research laboratories.

Geo. W. Fleming has become Eastern representative of the Pittsburg Gage and Supply Company, with headquarters in the Singer Building, 91 Liberty street, New York. Mr. Fleming, besides being a salesman, is an expert on brass finishing tools.

DEATHS

CHARLES LOEB.



CHARLES LOEB.

Charles Loeb, president of Zucker and Levett and Loeb Company, manufacturers of and dealers in platers' supplies, died at his home in New York Sunday, March 20, 1910, after a short illness. Mr. Loeb was born in New York in 1842, and when he was eleven years old he went to North Carolina, where he was employed in the dry goods business. He served in the Confederate Army during the Civil War. He came North at the close of the war, and in 1881 we find him connected with the Zucker & Levett Chemical Company as treasurer. After a few years with this concern he retired to form a company of his own, known as The Loeb Chemical Company. This business was continued until 1894, when the two concerns were merged as The Zucker and Levett and Loeb Company, and Mr. Loeb became president of the corporation. He occupied this position at the time of his death and remained an active member of the firm to the last. There is no one in the industrial world of which he was a factor who will be missed more than will Mr. Loeb. Always accessible, courteous to a degree, he always manifested a deep interest in his visitor's affairs, either business or personal. Even if he did not agree with another person's views, he had a peculiar knack of smoothing out the difficulty and making one feel that it was entirely his fault (Mr. Loeb's) and not the interrogator's. Mr. Loeb leaves a widow, two sons, Walter L., assistant treasurer of The Zucker and Levett and Loeb Company, and Chas. L., who is connected with The Luzzatto Steel Company in Rome, Italy, and one daughter, Mrs. Luzzatto, who lives in Italy.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

APRIL 4, 1910.

Recently a number of the principal manufacturers were interviewed briefly on the conditions as they found them in the factories of Waterbury and vicinity during the first quarter of the year and the opinion expressed in practically every instance was that it was normal, if not better. None expected to find the reports poorer when completed than in the preceding year, and one ventured so far as to declare business had improved so much that this quarter began with the record fourteen per cent. higher than at the close of the first quarter of the calendar year of 1908. This figure came from one of the brass foundries, and the others claimed prosperous conditions, so it may be taken as a fair index of the situation.

There is one part of the metal producing business which is a bit dull now: That is the button branch. In the Scovill Manufacturing Company's button department there is no great rush, but on the other hand no serious laying off of help. This is considered the dull season in this line and conditions this year do not seem behind normal.

Generally, the output is up to the normal and the freight department of the New Haven road throughout the entire Naugatuck valley is kept busy handling both incoming and outgoing shipments. Conservatism predominates the general tone, but there is absolutely nothing heard which would seem even slightly to bear out the seeming lack of confidence in the permanency of present prosperous conditions.

The Baird Machine Company, which has been expanding in Oakville and for some time has been looking about for a more convenient location, recently petitioned the city authorities for a site on the grounds occupied by the town poor farm. This is fine land on the western side of the city and runs down an attractive slope to the Naugatuck river. It has often been mentioned as splendid land for factory sites, and the Novelty Manufacturing Company not long ago secured an option near there for future devolpment. The Baird Company's proposition is still unsettled, but there is a strong desire to get this company into the city and before next month it may secure the coveted property.

Building is being pushed on further additions to the plants of the Scovill Manufacturing Company and the Chase Rolling Mills Company and there is some extension work on a smaller scale in progress in some of the other shops.

No one has been named yet for the office left vacant by the death of Richard J. Ashworth, treasurer of the Chase Rolling Mills Company, and it is possible that this vacancy may not be filled for a month or two.—F. B. F.

BRIDGEPORT, CONN.

APRIL 4, 1910.

Business continues to be brisk with a majority of metal manufacturers in this city. All the factories are running full time, with the exception of the Fairfield Aluminum Company, where work has not been as plentiful as usual, so that it has been necessary to lay off a number of hands temporarily.

The new plant of the Whiting Manufacturing Company, one of the largest makers of solid silver hollow and flat ware in the world, is all but completed, and H. H. Hamilton, the resident member of the company, announces that in a week the wheels will begin to turn in a portion of it, and it is hoped to have all departments in working order by the middle of April. It is expected that at least 350 hands will be employed at an average of $19 a week.

The Bryant Electric Company is going to build an additional plant which will cost about $40,000, and which means that between 200 and 250 extra hands will be employed. This announcement was made at the hearing before the common council on the petition of the Bryant Electric Company for the extension of the building line on its property on the east side of Hancock avenue.

There has been a boom in the automobile business during the past week or two, brought about by the recent Dealers' Automobile Show held at the armory. A great deal of interest was manifested in the exhibits, and many orders have been placed as a result.

Work has been commenced on a large addition to the plant of the Locomobile Company of America, which will mean the employment of 250 more hands and facilities for an increase of 300 cars a year in their output. The addition is made absolutely necessary by the increased business of the concern since their present plant is utterly inadequate to turn out enough cars to supply the demand. The new structure will be built just east of the present factory buildings and will be known as Factory No. 3. It will be in accordance with the plans for an increase in the plant as originally laid down when the plant was built. In construction and architecture it will be similar to the present building. The contract calls for the completion of the work within four months.

For some time this factory has been crowded to the limit in order to get out its work and has been compelled to run a good deal nights. Since one of its cars won the Vanderbilt race the fame of the locomobile has spread so that its merits became more generally known, resulting in a great demand for this make of cars. It is understood on supposedly competent authority that work has been commenced on 2,000 1911 cars, which will mean that the already crowded conditions at the plant will be intensified.

There has been no change in the labor situation during the past month, and it is confidently hoped that nothing will arise to disturb the harmonious relations that now exist between the employers and employees this spring.—E. L. H.

PHILADELPHIA, PA.

APRIL 4, 1910.

Industrial conditions disturbed by a general sympathetic strike called in aid of striking street car men, have been restored to normal. The strike of the car men has been virtually lost, and the National Association will suffer most from this failure. Political interests may yet compel the Philadelphia Rapid Transit Company to go through the motions of granting the men something, but, in reality, the strikers will get nothing more than they can have now for the asking in person or through any one of the three organizations now representing them.

The victims of the strike will be the City of Philadelphia as a city; the Republican organization in the State, and the families of the men on strike. The city will suffer most from the sensational and false reports sent throughout the world describing attempted lynchings in the heart of the city, riots with hundreds dead in the street, and dynamite outrages which never took place.

The metal industry is as much concerned in having the exact status of affairs known as any other. Buyers of metal will not come here in peril of their lives any quicker than buyers of other commodities. All peril is past, if there ever was any to pedestrians, and business is again progressing in orderly fashion in all sections of the city except the Kensington district, where the labor sentiment is very strong and feeling is intensely bitter against the transit company because of long-continued poor service and general discrimination.

Nineteen people, mostly children, have been killed by the cars during the past six weeks. This is nine above the average. One policeman has been taken to his grave as a result of beatings received during the strike. The official records show that five policemen were killed last year when there was no strike. No pedestrians have been killed; only seven have been seriously

injured and these in street brawls in localities where such disturbances are common, and there the hospital records show about this same number injured in the same way all the year round.

The dynamite outrages reported, with one exception, were based upon the frequent explosion of percussion caps, such as are used on every railroad in the land every day in the year, and which come into more frequent use just prior to the Fourth of July.

A Philadelphia mail order house is shipping brass all over the world to amateur artists who have taken up the fad of hammering brass. The School of Industrial Art, Drexel Institute and the Berean Training School, are all conducting classes in hammered brass, and a considerable market has thus been created. The shops at Atlantic City, Cape May, Ocean City and the other resorts are liberal buyers of the material which seems to have taken the place of burnt wood as a fad in artistic endeavor.

The United Gas Improvement Company has opened a demonstration store at Eleventh and Market streets, showing forges, ovens, annealers, brazers, heaters, and generators of all kinds for the treating of metals by high heat.

Plans have been prepared for a new plant for the Fox-Kappler Foundry Company.

The General Electric Company is placing very large orders for copper.

All of the retort establishments and others dealing in old gold have been ordered to install telephones at once by the Department of Public Safety, and the proprietors have been notified that they will be closed up and put out of business if they fail to make early and accurate reports concerning all metals bought from others than known traders. The city has installed an elaborate and costly index system for the listing of stolen jewelry, and this telephone system is part of the plant which also takes in all the pawn shops in the city.

William H. McCallum, Irving McCallum and Henry K. Fort are named as the incorporators of the Henry K. Fort Company, which is to be chartered by the Governor of Pennsylvania. This company proposes to smelt, refine, reclaim, amalgamate and prepare for market all manner of metals, drosses and mineral substances.

The Bennett Jewelry Company, of Philadelphia, has been granted a charter by Governor Stuart of Pennsylvania. Capital $15,000.

Isaac Halpern, David Halpern and Paul Halpern have joined in an application for a charter for the Isaac Halpern Brothers & Co., the object of which corporation is to buy, sell and trade in all kinds of metals and to smelt and refine the same. Harold Moon is counsel for the incorporators.

BUFFALO, N. Y.

April 4, 1910.

Non-ferrous metal foundries are very busy in Buffalo. All the large firms report that the demand for non-ferrous castings is larger than ever before. Many of the leading companies have employed additional men and all managers predict that 1910 will be a banner year in their industry. Not one bit of pessimism is uttered.

The Aluminum Casting Company, of Buffalo, is doing a rushing business. The old plant is no longer able to look after the increasing business and a short time ago a contract was let to build a new plant on Hertel avenue in Buffalo. This plant, with the equipment when completed will have cost about $70,000. The new building is now being equipped with all such machinery and apparatus as will make it one of the most complete non-ferrous metal foundries in the State. Bids are also being received by the Aluminum Casting Company for a plant, which will be a duplicate of the new Buffalo plant, to be built at Bridgeport, Conn.

The Lumen Bearing Company of Buffalo is an up-to-date non-ferrous metal foundry. A contract was let for a complete metallurgical laboratory and this has just been completed. The laboratory is thoroughly equipped. The chemist in charge is progressive and does not confine his activities to testing and experimenting only with the things that are needed in the regular course of the work. He is constantly experimenting with the different metals which come under the head of non-ferrous and is trying to find different ways of treating them.

The laboratory was two months in building, and is a model of its kind. Besides this, the company is doing other things that will tend to broaden its business. W. H. Barr, the general manager of the company, recently went to Detroit with a view to obtaining contracts from some of the large automobile industries there to make some of the non-ferrous parts. The result of Mr. Barr's trip was not learned.

W. M. Corse, works manager of the Lumen Bearing Company, stated that his concern intended to turn out the best products possible. About 175 men are employed there.

The Electrolytic Products Company has been incorporated in Buffalo. Attorney Frank A. Abbott is secretary and treasurer and a director of the new concern, which will manufacture motor cars and radiators by electricity. The corporation will also conduct a general electrolytic business and manufacture by electricity seamless radiators for gas and gasoline engines and for houses. It is reported that the concern will erect a large plant near the northern city line, Buffalo, and the construction work will be started as soon as an available site is offered. The capital stock of the company is $100,000 and the directors are Mr. Abbott, Henry C. Steul and Joseph Porzel.

According to a report from Niagara Falls, the Aluminum Company of America has applied in that city for a permit to erect a $15,000 addition to its No. 3 plant near the Hydraulic Power Canal. It is reported that the addition may be used as a rolling mill.

Four young men recently pleaded guilty in a Buffalo Court to having stolen brass valves from cars on the Buffalo Creek Railroad. One of the prisoners was fined, two were placed on probation and the sentence of the fourth was deferred for a time.

The Willet Engine and Carbureter Company, of Buffalo, announce that they will manufacture the Willet two-cycle gasoline engine for motor cars and other purposes. They will also give special attention to the manufacture of commercial vehicles. The company states that they will increase their capital stock to $1,000,000. They have opened temporary offices at 420 Prudential Building, Buffalo.

Manufacturing jewelers and other users of non-ferrous metals will send representatives on a big trade excursion to be conducted this month under the auspices of the Buffalo Chamber of Commerce and Manufacturers' Club. The party will visit several nearby cities and villages and boom products made in Buffalo.

According to latest reports the new plant which the King Sewing Machine Company will build in Buffalo will be completed in August at a cost of $100,000. It is said that the factory will give employment to 250 skilled mechanics and will have a capacity of 100,000 sewing machines a year. The plant will face Welland street, commencing at the corner of Rano street. It will have a frontage of 416 feet on Welland street and a depth of 245 feet, extending across the end of Bleecker street. It will contain 100,000 square feet of floor space and will be fireproof throughout. A separate building will house the enameling plant. The main building will be one story high and there will be a tower 92 feet high, containing three floors for office use. Every square foot of floor space will be reached by direct daylight.

Fire on the morning of April 3 visited works No. 1 of the Aluminum Company of America, on the lands of the Niagara Falls Power Company, Niagara Falls. Damage was done to the east end of the building, where the flames originated.

Goods containing various non-ferrous metals and totaling in value many thousands of dollars were exhibited at the Power Boat and Sportsmen's Show which closed recently at Convention Hall in this city. The exhibition was held under the auspices of the Buffalo Launch Club.

The Real Estate Association of the Buffalo Chamber of Commerce and Manufacturers' Club recently prepared a report and compiled statistics about the copper smelting industry in Buffalo. The report shows that Buffalo is almost the only city in the country that has a copper smelting plant within its city limits; New York City has several just outside the city. Chicago has one on Blue Island near the city line and Ansonia, Conn., has one in the city. There formerly was one in Bridgeport, Conn., but it has been abandoned, it is said.

The plant in Buffalo is that of the Buffalo Smelting Works. When running at full blast they are able to produce about 8,000,000 lbs. of ingot copper per month in various forms, but at the present time the output is about 6,000,000 lbs. per month. More than 4,000 tons of copper ore is sent to this plant each year, principally from the Calumet and Hecla mines in Michigan.

It requires about 1,400 horsepower to operate the handling apparatus and machinery at the Buffalo Smelting Works. This power is received from Niagara Falls.

Most of the output of the Buffalo Smelting Works is used in this city. There are a large number of industries which use copper in crude and in large quantities. The Buffalo Copper & Brass Rolling Mill uses about 700,000 lbs. of copper per month, or about 10,000,000 lbs. per year, turning it out in the form of copper sheets, tubes, rods and wire.

The George A. Ray Manufacturing Company, of Buffalo, consumes about 1,500,000 lbs. of sheet copper and 1,000,000 lbs. of sheet brass and circles per year, besides a considerable quantity of brass and copper tubing.

The Aldrich Manufacturing Company, of this city, uses about 1,000,000 lbs. of sheet copper and about 200,000 lbs. of sheet brass per year.

The Buffalo Manufacturing Company uses 400,000 to 500,000 lbs. of copper and brass per year in the manufacture of its various products.

One of the largest consumers of copper and brass is the Republic Metalware Company. This is used in the manufacture of kitchen utensils, etc.

The United States Headlight Company, of this city, uses about 100,000 lbs. of copper circles yearly in the manufacture of locomotive and trolley car headlights.

The Buffalo Lamp Company, manufacturers of automobile lamps, uses a large amount of sheet copper and brass, as does the Buffalo Tube Company.

Besides the companies mentioned there are numerous small manufactures here that use copper and brass in quantities. Manufacturers of brewers' kettles use a large amount of the metal. The largest consumer along this line is the Kast Copper & Sheet Iron Company.

The report mentions other phases of the copper industry also. "The aggregate tonnage used causes Buffalo to rank high as a copper producing city," concludes the report.—J. A. M.

CLEVELAND, OHIO

April 4, 1910.

This city is becoming more and more important as an aluminum producing center. It is claimed here that Cleveland produces more aluminum castings for use in automobile and airship work than any other center in the world. With this record, it is interesting to note the addition of another new company to the already good sized list of aluminum foundries located here.

The A. B. C. Castings Company has been incorporated and will open a factory in this city. It has a capitalization of $100,000. A site has been purchased at Carnegie avenue, Southeast and East 65th street, where a plant 70 ft. by 324 ft. in size will be erected this spring. It is expected to be ready for occupation some time during the month of May. The officers of the new company are I. Levy, president; T. L. Johnson, vice-president; A. D. Levy, secretary and treasurer, and H. E. Behr, general manager. A general line of aluminum castings will be turned out. It is planned to equip the plant with the most modern devices for the production of aluminum.

The other aluminum companies here are not worrying concerning any additional competition which may be caused by the new concern for the call for aluminum castings is becoming greater each year and they are being used for a much wider range than ever. One company here makes all the aluminum castings for the Curtiss aeroplanes, while all the local concerns here go in heavily for castings used in automobile work. Cleveland and Detroit being the largest auto centers in the country, the local companies naturally manage to look after much of the business offered.

Conditions with the metal trades here are very satisfactory. Naturally much of the work is coming from the automobile factories. The brass foundries and plating establishments are all being pressed for work.

A line which is flourishing just now is the gas and electric fixture work. With building under full sway again these establishments find increased orders from every point and are being taxed to capacity in looking after their trade. Fixtures are becoming more attractive each year and naturally are running into much more money than formerly, when the plainer varieties were used almost exclusively. Modern building methods demand the introducing of both electricity and gas, and fixtures must be provided for both varieties.

The big factories here engaged in the manufacture of brass and plated plumbing fixtures report a good business. Orders are coming in from every direction in anticipation of a big year's building. Some fear is entertained that some factories may be closed down for lack of coal should a strike occur among the steam coal miners. The manufacturers, however, are not borrowing trouble and are not worrying much about a situation which has not come to pass as yet.

The Art Metal Construction Company, of Jamestown, N. Y., has notified the county building commission that it is busy working on the new art metal fixtures for the county courthouse, which is being built here at a cost of $4,000,000. The company's contract runs to about $117,000. It includes a large amount of bronze work in addition to steel furniture. In connection with the new courthouse the commission engaged in supervising its erection has awarded the general contract for hardware to the George Worthington Company, of Cleveland, who will supply stock furnished by the Yale and Towne Manufacturing Company. Its bid for about $30,000 was the lowest. Other close bidders were the Lockwood-Luetkemeyer-Henry Company, of Cleveland, representing the Russell & Irwin Company and the William Bingham Company, representing the P. & F. Corbin Company. All hardware is of the finest cast brass and bronze. The contract must be completed within a period of five months.—S. L. M.

DETROIT, MICH.

April 4, 1910.

The brass and copper industries in Detroit during the past month continue to report a steady progress in every line. The manufacturers at the present time, however, are becoming enthused over the coming convention of the Allied Foundry Associations, which opens on the State fair grounds here June 6 and continues until June 10.

This event has every indication of being the greatest that has ever been held by the organization. The program is filled with interesting features that cover both intellectual and pleasure requirements of such a gathering. The State fair grounds are only seven miles from the center of the city and easily reached by a one-minute street car service that is pronounced the best in the world.

Every brass manufacturing establishment in the city has been running to its full capacity during the month just closed, and notwithstanding the prediction of certain pessimists that the present vigorous business would begin to fall off before the month ended, it instead is keeping up strong and has every indication of maintaining its present gait for many months to come. So enthusiastic are the manufacturers that many improvements in factories are in contemplation. Among these are noted the progress at the Detroit Brass and Copper Rolling mills on Clark avenue. This is the largest plant of the kind in the Middle West. This institution at present is establishing a great power generator that gives promise of meeting every demand of this concern which has recently reincorporated for $2,000,000. One year ago this same concern increased its capital from one million to a million and a half. The Clayton and Lambert Manufacturing Company, another of Detroit's thriving brass concerns that is now engaged largely in the manufacture of automobile parts, has also installed a large generator to meet the requirements of their rapidly increasing business. Many other factories will soon establish other improvements.

The Diamond Manufacturing Company, producer of plumber supplies, brass and copper stampings and automobile parts, reports an unusual growth of business and is running every available employee it can secure. The management accounts for this rush of business through an anticipated rise in copper.

The American Car and Foundry Company has recently received a large number of orders for new cars, especially for use in transporting automobiles. Large quantities of brass castings are used in the production of these cars, and this also helps in increasing the demand for brass products.

The Atlas Foundry Company is the latest concern devoted to the manufacture of brass automobile parts to incorporate in Detroit. The stockholders are William Christian, Robert Crawford and John D. McKay. The capital stock is $50,000. This new concern has taken over the plant of the National Motor Cast-

ing Company and extensive alterations and additions are being made. Another concern in this same business that is branching out is the Eby Auto Parts Company, which has recently increased its capital stock from $5,000 to $25,000.

The last of the General Motor common stock was sold Monday in the local market at $100.25 per share. The price a month ago was around $75 a share. This rise in stock is said to be due to the fact that the great automobile concern will pay dividends this year that will exceed expectations entertained a month ago.

Mr. Hugh Chalmers denies the rumor circulated during the past few weeks that the big automobile plant that bears his name has joined one of the big combines. The Chalmers automobile has entered no combination, he declares, and furthermore none is contemplated.

Among the new concerns that have been incorporated during the past two weeks are the following: The Standard Automobile Accessory Manufacturing Company, with a capital stock of $4,000. The stockholders are Earl F. Jackson, Bernard H. Camden, Harry W. Bertram, Frank L. Lamoreaux and Charles H. Gleason, Jr.

The Mt. Clemens Motor Car Manufacturing Company, of Mt. Clemens, near this city, with a capital stock of $200,000. The incorporators are Robert Klagge, Fred Breitmyer, Charles Loneby and H. H. Thorpe.

The National Cable and Manufacturing Company, of Niles, Mich., with a capital stock of $40,000. The incorporators are Marue Cau, Chicago, Albert Dennis and C. K. Anderson. The company will manufacture brass wire, metal parts and various other goods along this line.—F. J. H.

SAN FRANCISCO, CAL.

April 4, 1910.

San Francisco is going to have a World's Fair in 1915 to celebrate the opening of the Panama Canal. Good news like this is stimulating every trade along the Pacific, especially ours of the non-ferrous metals. Hear the optimists now: "Do we not mine the ore of these metals in the Sierras and along the hillsides; do we not smelt and refine them along the shores of San Francisco Bay, and the Shasta, San Zuagiun, Sacramento, and Russian Rivers to be shipped to the East and turned into Brittania, brass, German silver, copper, lead goods, silver, gold, nickel, copper-plated, oxidized, etc.?

"Why, with the opening of the Panama Canal we will have the world's markets at our doors, the lead, zinc, gold, silver, copper, autimony, etc., ores will be manufactured right here in the city and its vicinity in thousands and thousands of articles, electroplated, japanned and otherwise finished and sold in competition with foreign and Eastern manufacturers. We have the climate here: never too cold in the winter, never too hot in the summer. The South has done and is doing now the same in cotton goods. We will do as well in the metal line." Everybody is looking for prosperous and busy times at more profitable prices.—L. S.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

Additional Trade News will be found under "Correspondence."

M. L. Oberdorfer, of Syracuse, N. Y., is about to erect a brass foundry building, for which power machinery will be needed.

A new brass foundry will be built in Somerville, Mass., by T. F. McGann Sons Company, 104 Portland street, Boston, Mass. The foundry will be 50 by 150 ft.

It is reported that the Seymour Metal Goods Company, Seymour, Conn., will establish a factory for the manufacture of German silver and brass novelties.

The Ajax Metal Company of Philadelphia, Pa., report that their foundry is at present overrun with railroad work, their plant being pushed to its utmost capacity.

The E. J. Manville Machine Company, manufacturers of thread-rolling and special machinery, Waterbury, Conn., has increased its capital stock from $25,000 to $100,000.

The J. W. Paxson Company of Philadelphia, Pa., are planning to have a molding machine in operation at the coming Detroit Convention of Foundrymen and Manufacturers, June 6-10.

The Tabor Manufacturing Company, of Philadelphia, Pa., builders of molding machines are running to full capacity. With the continued increase in their business they are planning at some future day to enlarge their plant.

H. M. Shimer & Co., Philadelphia, Pa., report continued remarkable success with their brazing solder, which they are selling all over the United States and Canada. This firm also makes a specialty of high-grade spelter.

The Pittsburg Gage and Supply Company, Pittsburg, Pa., are doubling the size of their brass foundry, and part of the extension includes a new core room. They bought recently a number of Tabor molding machines and two more melting furnaces.

The Rome Manufacturing Company, Rome, N. Y., manufacturers of copper and brass goods, are now considering the installation of machinery for a new plant soon to be erected. The building will have two stories and will be 60 by 300 ft. long.

R. F. Lang, 31 Broadway, New York, whose "Royal" brands of manganese, phosphor and silicon copper are well known to the foundry trade, has introduced a new hard solder, "Ferrol Hocksit," which affords a simple and rapid method of repairing broken iron castings.

It is reported that the Aluminum Goods Manufacturing Company, of Newark, N. J., manufacturers of all kinds of aluminum goods, will in the near future consolidate the Manitowoc and Two Rivers, Wisconsin, plants, but nothing definite has as yet been decided.

T. Schueler & Company, Newark, N. J., have had plans prepared for a new brass foundry brick building 25 x 50 ft. to cost about $4,000. The business of this company in aluminum castings, gear casings annd vacuum cleaners have increased so rapidly during the past year that it necessitates the enlarging of their present quarters.

The O. M. Edwards Company, of Syracuse, N. Y., are adding to their already large and extensive business, the manufacture of gates, globes, angles, checks, and radiator valves. These goods for the present are to be made in brass alone, but they expect in the near future to go extensively into the manufacture of iron and steel valves.

The Ideal Furnace Company, Philadelphia, Pa., have installed their furnace at the Wm. Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa., after a 30 days' competitive test with other coke and oil fired furnaces. The same firm is equipping the new plant of the Sanitary Company of America, with a battery of eight furnaces.

Tate, Jones & Company, Inc., Pittsburg, Pa., have just made an initial shipment of oil burning equipment for use in a roasting kiln in a large metallurgical plant in Austria Hungary. This company's apparatus was selected on account of their experi-

ence in designing and building oil burning equipment for work requiring special and complicated treatment.

The Crescent Brass Manufacturing Company, Reading, Pa., have increased their former capacity, relating to the foundry end, about 25 per cent. and have added a finishing department to the factory. This concern manufactures brass, bronze and aluminum articles and makes a specialty of rolling mill bearings, chandelier parts and machine work of any kind.

The Philadelphia Roll and Machine Company, Philadelphia, Pa., are building a new machine shop 68 x 130, which they expect to occupy in about two months. The old machine shop will be used for foundry purposes. With the old and new buildings the entire plant will occupy nearly a whole city square. The company are builders of rolls and rolling mill machinery for metal plants.

Northern Engineering Works, crane builders, Detroit, Mich., have been placing orders for new tools and machinery consisting largely of lathes, gear cutters and milling machines, etc., for several months past and the machinery is now being installed. They report a good volume of business on their books, the demand for their standard electric traveling cranes being unusually good.

The Comstock-Wellman Bronze Company, Cleveland, Ohio, are building an addition to their foundry of 50 x 109 ft., with concrete foundations and brick walls. The property is L shape, being 75 ft. on Superior avenue and 85 ft. on East 60th street, each 267 ft. deep. An office building, sand sheds, stable, etc., are also contracted for and will be constructed along with the foundry building.

The Exeter Machine Works, Pittston, Pa., manufacturers of Stone's bronze and marine appliances, brass and bronze castings, have just completed and started a modern up-to-date brass and bronze foundry for the purpose of manufacturing manganese bronze, gun metal, aluminum castings and other alloys for railway and automobile work. They are now in a position to handle castings up to 20 tons capacity.

The New Jersey Zinc Company are erecting a monster plant in Carbon County, Pa., which will cost two or more million dollars. The company now employs 1,500 men and as soon as the plant is in operation the number will be greatly increased. It has already spent several million dollars putting up oxide and other furnaces together with the necessary buildings for its work of manufacturing zinc, oxide and spelter.

The Powhatan Brass and Iron Works, of Charlestown, W. Va., are putting an addition to their foundry 42 x 60 ft., making their present foundry 150 x 42 ft. of clear molding floor. They are also putting in a battery of eleven furnaces, a hand power crane and building a coke storage bin with a capacity of 4 carloads, together with sand sheds and fireproof pattern storage building, also lavatories and dressing-rooms for the help.

The Lovell, McConnell Manufacturing Company, makers of the Klaxon and automobile accessories, have outgrown their present factory and have purchased 10 lots on Wright street and 2 lots on Emmet street, Newark, N. J., and are building a new plant. The machine shop is 200 x 50 feet; two stories and basement; and the foundry 75 x 40 feet. There will also be the power plant building, a fireproof building for storing excelsior and a private garage.

The Turner Machine Company, of Philadelphia, Pa., have moved from their old quarters, 2049 N. Second street to 3632 N. Lawrence street, where they have a larger and better shop. In their new location they will have a modern plant in every particular and they can turn out twice the amount of work that they did in the old. The Turner Machine Company are builders of cock grinders, molding machines, sand sifters, sprue cutters, key lathes, iron flasks and make to order metal pattern work.

I. Shonberg, 363 Hudson avenue, Brooklyn, N. Y., reports that he is winning out on a number of tests of his "M M" grade bearing metal. This metal has been sold to the Arbuckle Sugar Refinery of Brooklyn, to the American Locomotive Company, Providence, R. I., and also put in service on a Pacific Coast steamer, and all of the tests have been satisfactory, and in some cases it has stood up the best of any of the bearing metals used in a comparative test. The firm's new "Catalog S" gives all of the particulars.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., May 3, 1910, and publicly opened immediately thereafter, to furnish at the navy yard, Puget Sound, Wash., a quantity of naval supplies, as follows: Sch. 2372: Brass tubing. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office, Seattle, Wash., or to the Bureau. E. B. Rogers, Paymaster-General, U. S. N.

The casting department of the Wiener Machinery Company, 50 Church street, New York, is now in a position to handle any size casting in any metal, being recently appointed New York agents for the well known brass and metal foundry of Clum & Atkinson, of Rochester, N. Y., the Valley Foundry Company of Canal Dover, Ohio, and continuing as agents for the Hubley Manufacturing Company. The Wiener Machinery Company employs several experts in the casting and manufacturing line, who attend personally to all inquiries.

The Spargo Wire Cloth Company, Rome, N. Y., is intending to double its present capacity at once. This company, which was incorporated fourteen months ago, has not been able to keep up with its orders even by working nights. The present mill in East Rome is 100 x 100 ft. Another 100-ft. unit will be added and it is expected that the new plant will be completed by the time of the first anniversary of the occupying of the present part, which is Aug. 1, 1910. The cloth is manufactured from the wire of the James A. Spargo Wire Company, adjoining the new plant and utilizes from 6,000 to 8,000 lbs. of wire per week.

It is announced in the daily press that at Erie, Pa., the General Electric Company, of Schenectady, N. Y., will soon erect a monster plant to give employment to 20,000 men. Eventually the plant will be made one of the largest industrial centers in the world. The work of enlarging the Schenectady plant is under way, and soon the number of employees there will be 20,000. It is reported that 800 acres of ground have been secured at Erie, and the initial floor space will be 150 acres. Twenty large buildings and thirty-eight smaller ones will be erected. A foundry, pattern shops and warehouses will be put up in Erie.

Thiery & Kendrick Manufacturing Company, at 660 Franklin street, Detroit, Mich., has just completed one of the largest brass foundries in the State. The main building is 102 by 200 ft. This company began operations in Detroit in July, 1907, and now gives employment to 90 persons. When all the machinery is installed work will be given to 150 men. Goods are made in brass, bronze and aluminum. Considerable work is also being done for automobile factories. The manager is John Thiery and the secretary-treasurer, Horace Kendrick. Mr. Thiery has charge of the foundry department and Mr. Kendrick the mechanical department.

The Eureka Pneumatic Spray Company, 276 Spring street, New York, the originators and patentees of the machinery and process of applying all kinds of liquid materials to every class of manufactured articles by compressed air with the air brush, have made another addition to their regular business of supplying outfits to manufacturers. They have just fitted up two lofts at their present address and will hereafter take contract work in high grade and art finishes only, on such work as enameling plumbing seats, tanks and fixtures; finishing high grade buttons, buckles, novelties, etc., and applying the new patent leather finish to automobile lamps. The same finishes they will also apply to other high grade articles of manufacture. Full information can be had on application to the company's office.

The Elmira Machine Works, Elmira, N. Y., have moved to Union, N. Y., where they have a new and larger plant—better shipping facilities, better help supply and larger capital. They now have two acres of land adjoining the Erie railroad tracks, with a siding. The plant consists of a new two-story concrete building, 120 by 32 feet. Steam power is used to operate a high speed automatic engine; the power is transmitted by electricity to motors in different parts of the factory. The company has its own die-making, plating and wood-working departments, in addition to facilities for light screw machine, press, bending and similar work. This concern manufactures post card display racks, store display fixtures, children's carts and numerous other articles of similar nature. Having surplus capacity in their plating plant, they are now advertising that they are ready to do electroplating of any description in large quantities.

Guiterman, Rosenfeld & Company, New York, and of London, Paris and Hamburg, a prominent firm of exporters, have recently started an import department for the sale of metals in this country and are now doing an active and increasing business, particularly in foreign aluminum and platinum. Having their own European connections they are naturally enabled to keep in the closest possible touch with the foreign markets. The bulk of aluminum sold by them is in ten tooth ingot form, guaranteed 98/99 per cent. pure. The firm states that actually the material runs a higher grade of purity than the guarantee indicates, and gives the analysis of eight actual shipments taken at random, which shipments showed the following percentages: Aluminum, from 98.72 per cent. to 99.60 per cent.; iron, from 0.24 per cent to 0.92 per cent.; silicon, from 0.14 per cent to 0.55 per cent. The company states that foundries using this foreign aluminum have found it entirely satisfactory. They are making a specialty of prompt deliveries and in order to be able to supply rush orders a stock is kept in New York from which deliveries can be made immediately. The platinum handled by this firm is what is known as soft platinum, guaranteed 997 8/1000 pure, and comes in ingots weighing about 17 troy ounces each.

SALE OF OLD MATERIAL BY THE UNITED STATES GOVERNMENT.

There will be sold at the Navy Yard, Boston, Mass., material belonging to the Navy, condemned as unfit for use therein, consisting of engines, pumping machinery, machine tools, hand tools, ordnance stores, boats, cutters, hawsers, rope junk, wire, furniture, zinc dross, musical instruments, kitchen utensils, packing, gas plant, etc. The sale will be for cash to the highest bidder, by sealed proposals to be opened at 12 o'clock, noon, April 22, 1910. Schedules containing form of proposals and terms of sale can be obtained upon application to the General Storekeeper, Navy Yard, Boston, Mass. BEEKMAN WINTHROP,
Asst. Secretary of the Navy.

CHANGE IN FIRM

C. Drucklieb, 178 Washington street, New York City, announces that he has disposed of his interest in the manufacture and sale of the injector sand blast apparatus to James M. Betton, who has had the practical management of this branch of his business for the past five years.

The sand blast business will be carried on, as heretofore, under the name of J. M. Betton, at 178 Washington street, New York City.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

NON-RUSTING METAL COMPANY, of Edgewater, N. J. Capital stock, $100,000. To extract metals, etc. Incorporators: G. F. Martin, E. J. Forham, J. J. Harper, New York.

YELLOW METALS COMPANY, New York City. Capital stock, $25,000. To manufacture and deal in all kinds of metals. Incorporators: W. Jacobs, H. Jacobs, J. Candler, New York City.

FRANCIS-YUNG COMPANY, New York City, N. Y. Capital stock, $41,000. To manufacture and sell metal buttons, novelties, etc. Incorporators: C. D. Francis, B. G. Yung and M. Friedman, New York City.

NASSAU STEEL AND IRON WORKS, Brooklyn, N. Y. Capital stock, $5,000. Manufacturers and dealers in iron, steel, copper and other metals. Incorporators: J. Wolfe, Brooklyn, N. Y., and F. H. Reed, New York City.

S. M. SMITH METALS RECOVERY COMPANY, New York City, smelt, refine and recover metals of all kinds, etc. Capital, $100,000. Incorporators: O. O. App, New York City; S. M. Smith, Boise, Idaho; R. J. Cromble, Brooklyn, N. Y.

THE NATIONAL IRON AND METAL COMPANY, of South River, N. J. To deal in iron, steel, brass, manganese, coke, copper, etc. Capital, $50,000. Incorporators: S. Gazsik, S. Horvath, J. Kocher, J. Haygato, South River; P. Wagi, M. Toth, New Brunswick.

BRONZE METAL COMPANY, Augusta, Me. Capital stock, $1,500,000; nothing paid in; par value, $100. To deal in metal castings. Incorporators: President and treasurer, E. M. Leavitt, Winthrope, Me., Lewis A. Burleigh, Ernest L. McLean, M. M. Spinney, M. F. Sheelan, Augusta, Me.

THE A. B. C. CASTINGS COMPANY, Cleveland, Ohio, which was recently organized to build a plant for the manufacture of aluminum, brass and bronze castings, has effected its organization by the election of the following officers: President, I. Levy; vice-president, T. L. Johnson; secretary and treasurer, A. D. Levy; general manager, H. E. Behr.

FINANCIAL

The annual report of Phelps, Dodge & Company, Inc., New York, for the year ending Dec. 31, 1909, shows the following financial results: Dividends received from subsidiary companies, $5,769,354.50; commissions and miscellaneous earnings, $256,385.67; total income, $6,025,740.17. Dividends paid, $5,396,652; expenses, taxes, etc., $182,528.68. The amount transferred to surplus account was $446,559.49. The report gives details of the operations of the subsidiary companies, comprising the Copper Queen Consolidated Mining Company, Detroit Copper Mining Company of Arizona, Montezuma Copper Company, and Stag Cañon Fuel Company. The copper sales department in 1909 marketed 185,033,415 lbs. of copper on account of the subsidiary companies and other producers.

The annual report of the National Lead Company for the year ended Dec. 31, shows net earnings of $2,993,420, against an increase of $90,667 over those of 1908. The payment of $1,705,732 in preferred dividends and $1,032,770 in common dividends, these disbursements being the same as in the last year, left a surplus of $254,918, against $164,251 in 1908. This addition to the previous surplus brought the total surplus at the end of the year up to $4,713,373.

The volume of business done, President Cole told stockholders in his report, exceeds in tonnage anything in the company's history. In the last half year all raw materials were advanced in value, and increases were made in the prices of manufactured goods. These increases in the value of raw material and the increased volume of business employs all of the company's working capital and surplus, President Cole states.

Of the current year so far President Cole says that it shows an increase of business over the same period of last year and justifies a hopeful outlook.

BUSINESS TROUBLES

The American Brass and Aluminum Works, of Indianapolis, Ind., was recently put in the hands of a receiver in the State Court. Thereupon certain creditors filed a petition in the U. S. Court to have the company adjudged a bankrupt. The debts of the company are somewhere about $49,000 and the

assets about $20,000, and in view of this fact the creditors are being urged to get together in order to defeat the petition.

A bill asking for a temporary receiver for the Federal-Huber Company, manufacturers of plumbing and gas fitting supplies, of Chicago, was filed in the Superior Court recently by Henry A. Weber, Oscar Von Bermuth, the Henry Huber Company, and others. The bill also asks a preliminary injunction restraining the Federal-Huber Company from dispositions of the interests of the complainants in the Federal-Huber Company. The action results from the absorption of the Henry Huber Company, of New York, by the Federal Company, of Chicago, in 1908. The company is capitalized at $500,000, and is one of the largest concerns in the West making all classes of brass goods for plumbers and gas fittings.

REMOVALS

The Empire Art Metal Works, formerly at 134 West 14th street, New York, have removed to 610-614 Broadway, New York.

The Acme Plating Works, formerly located at 17 John street, New York were recently burned out and are temporarily located at 1838 Madison avenue.

FIRES

The plant of the Roe Stephens Manufacturing Company, one of the largest brass manufacturing establishments of Detroit, Mich., was destroyed by fire recently, entailing a loss estimated at $360,000. The plant was located at Parkison and Clayton streets and gave employment to several hundred men. The president of the company, O. W. Thomas, and Superintendent Flower place the loss as follows: Stock, $240,000; tools and machinery, $80,000; building, $40,000. The plant covered six acres and is practically laid in waste. Orders approximating $150,000 were on hand, among which were local orders for water gates and mains and material for the Fairview pumping station. The tools, lathes and heavier machinery are a total loss, as are also the large electric mills and boring machines. About fifty thousand dollars' worth of brass and iron scrap will be salvaged. This concern has another plant at McKinley avenue and the Grand Trunk railroad and owing to the fact that the destroyed plant was located in a part of the city that was difficult to reach by the fire department, it is possible the old site may be abandoned. President Thomas sustained the heaviest personal monetary loss as the result of the fire.

PRINTED MATTER

Diamond Dies.—A price list of these dies for drawing all kinds of wire has been issued by the Vianney Wire Die Company, of New York City.

Clean-Seat Valves and White Star Oil Filters are manufactured by the Pittsburg Gage and Supply Company, Pittsburg, Pa., and are fully described in the catalog which will be sent upon request.

Frederic B. Stevens, Detroit, Mich., manufacturer of foundry facings, supplies, etc., has issued a number of small folders, giving descriptions of the various supplies manufactured by him. These folders are unique and interesting in their way and will be sent upon request.

Catalog No. 26 has been issued by the W. D. Allen Manufacturing Company, Chicago, Ill., manufacturers of brass goods. This company manufactures a line of lawn and garden sprinkling devices, leather belting and hose brass goods, also an extensive line of plumbers supply material, belt dressing and mica packing

H. C. Cook & Bro., Ansonia, Conn., issue a concise description of "Vine's Patent Roll Caliper" which measures the comparative diameter of rolls automatically, the variations to a fraction of a thousandth of an inch being shown on a dial. This instrument is said to be very useful in indicating the extra taper when grinding bottom rolls.

Farwell Squeezers and Universal Molding Machines are described in a loose leaf catalog issued by the Adams Company, Dubuque, Ia., manufacturers of milling machines, gear hobbing machines, grinding stands, foundry molding machines, etc. This catalog is made up of pages taken from the various circulars issued by the company and each circular is devoted to a separate class of machine as manufactured by them.

Cylindrical Hardening Furnace for Gas or Oil Fuel is described in a circular issued by the Rockwell Furnace Company, New York City, which is a part of their "Bulletin G." These hardening furnaces are used for hardening tools such as milling cutters made of high speed steel. They also call attention to their "Barium Chloride" furnace for hardening, which they claim offers many advantages over the old method of hardening.

Chains.—An expensive catalog of 122 pages has been issued by the Standard Chain Company, Pittsburg, Pa., for 1910. This catalog is handsomely illustrated on heavy plate paper by means of half-tone cuts and gives full descriptions of the various styles of chains manufactured by this company. The Standard Chain Company claims that if there is anything in the chain line required, all that is necessary is to notify them and they can produce it.

The Graphose Age is a small pamphlet issued by the Chicago Bearing Metal Company, of Chicago, Ill., in the interest of their bearings, which they call "Graphose Bronze Bearings" and which are made after a scientific formula which represents the mistakes and successes of the past. This company also manufacture locomotive bearings, brass castings, aluminum castings, automobile castings, ingot metals, babbitt metals and alloys to any specification.

For some time past the Baird Machine Company, of Oakville, Conn., has issued at intervals bulletins describing their various products. Some new ones have recently been issued and the complete set now includes: No. 100—The Baird Automatic Four-Slide Wire-Forming Machines; 102—Wire Pointing and Pin Machinery; 103—Automatic Spring Coiling Machines; 104—Brass Butt Hinge Machinery; 200—Foot Presses; 201—Bench Power Presses; 204—Single-Action Pillar Pattern Presses; 300—Oblique Tilting Trumbling Barrels; 301—Steam Drying Barrel. Bulletin No. 303 shows their new tumbling barrel which is designed especially for use in tumbling small manufactured articles with steel balls; No. 399 describes a device for use in separating sawdust from small metal parts after tumbling, and also used for separating chips from screws and similar work.

AD NEWS

The Ideal Furnace Company, Philadelphia, Pa., are again advertising their tilting crucible coke-fuel furnace.

Guiterman, Rosenfeld & Company, New York, importers of metals, call attention to their ingot aluminum and platinum.

The Elmira Machine Works, Union, N. Y., are advertising for contracts for electroplating. They particularly desire orders for work in large quantities.

The Thomas W. Pangborn Company, foundry engineers, 89 West street, New York, feature some of their specialties in foundry equipment in this month's advertisement.

The Otto Gas Engine Works, Philadelphia, have increased their space and are emphasizing the many good features of Otto gas and gasoline engines which they make for all purposes.

Krizan and Hill, 521 East 72d street, New York, call attention to their modern facilities for manufacturing etched and engraved name plates, signs, dials, scales, etc. They also contract to do saw-piercing, stamping and electro-gold, silver, copper and nickel plating.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	April 9, 1910. Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States March 1, 1910.....	107,187,992
Production of marketable copper in the United States from all domestic and foreign sources during March, 1910	120,067,467
	227,255,459
Deliveries:	
For domestic consumption..... 62,844,818	
For export 40,585,767	
	103,430,585
Stock of marketable copper of all kinds on hand at all points in the United States April 1, 1910.....	123,824,874
Stocks increased during the month of March.....	16,636,882

The figures as published above, issued by the Copper Producers' Association, show an increase in the visible supply of marketable copper of 16,636,882 pounds during the month of March. The production amounted to 120,067,467 pounds, while the total deliveries were only 103,430,585 pounds. The domestic consumption was 62,844,818 pounds and the exports for the month were only 40,585,767 pounds or about 1,400 tons less than the exports as reported by the New York Metal Exchange.

These figures are decidedly bearish and point conclusively to the fact that production is ahead of consumption. Prices can hardly be advanced unless there is a systematic curtailment of output and with copper selling at 13 cents per pound and on a good paying basis it will be a difficult matter to arrange any lasting agreement.—J. J. A.

METAL MARKET REVIEW

NEW YORK, April 11, 1910.

COPPER.—Prices for standard copper in London show a further decline for the month of March of just about £2 per ton, making a total net decline since the beginning of the year of £6 per ton. Foreign stocks, according to the English and French statistics, continue to show a slight decrease.

The home market has been entirely without any interesting features. Consumers are pretty well supplied for the next six weeks, and with the water route from the Lakes now open, consumers look for a slight reduction from the quoted rates of the leading selling agents.

The exports for the month are smaller, amounting to 19,541 tons, making a total since January 1, 1910, of 71,478 tons, against 53,000 tons during the same period in 1909.

The range of prices during the period under review has been very slight, opening at 13.85, prices were pushed to close to 14 cents, with the slight advance in London, and judicious Wall Street announcements at the same time, this slight advance did not hold, and prices gradually sagged to very close to 13½ at the end of the month. We quote: Lake today, 13.60 to 13½; Electrolytic, 13¼, and Casting brands, 13¼ to 13⅛.

TIN.—The London "Bulls" took advantage of the statistical position of this metal of a month ago, and prices, after sagging off £5 per ton from the opening, advancing £9 per ton during the month, showing at the close a net advance since March 1 of £4 per ton.

In the domestic market the heavy consumption for March has been the dominating feature, as estimated by the secretary of the New York Metal Exchange, the consumption in America was 4,000 tons. This is a record consumption, and makes the total deliveries since January 1, 11,100 tons, against 9,800 tons during the same period in 1909. The shipments from the Straits were quite small, only 2,872 tons, against 4,170 tons in February and 3,407 tons in March, 1909. The total visible supply is just 1,000 tons less than a month ago, and the figures generally are considered "bullish."

Prices today are about one cent per pound higher than a month ago. 10-ton lots, spot, 32.75 to 32.80; futures, 5 to 10 points higher.

LEAD.—The foreign lead market has ranged from £13 2s. 6d. to £12 18s. 9d., and closes at the latter figure.

The New York market has declined about 20 points from 4.70c. to 4.50c. carload lots New York delivery at the close; the market is dull and heavy and prices may go lower. In St. Louis the market is quiet at 4¼c. East St. Louis.

SPELTER.—The foreign spelter market, owing to the combination, stays around £23.

In New York prices have sagged off about 15 points to 5.70c. at the close, carload lots, New York delivery, against about 5.85c. a month ago.

ALUMINUM.—Prices are unchanged, and the market is firm at 23 to 23¼c. for imported ingots, 98-99 per cent. pure, in 1 to 5-ton lots; for smaller lots prices range from 24 to 26 cents.

ANTIMONY.—Foreign market unchanged at £30 for Hallett's and £29 10s. for ordinary brands.

The New York market has been dull and flat, and prices are unchanged. Cookson's at 8½c., Hallett's at 8¼c., with Hungarian grades at 7¼c. Chinese antimony sold on a guarantee of 99¼ to 99½ pure is freely offered at 7¼c. in round lots.

SILVER.—The London prices have advanced about 1d. per ounce during the month, and closing at 24 3/16d. In New York prices show a net advance for the month of 2¼ cents per ounce, and closes at 52½ cents.

QUICKSILVER.—The foreign market holds fairly steady at £9 5s. In New York prices are easier and show a net decline for the month of about $2 per flask, closing at $48 per flask wholesale and $49 to $49.50 for smaller lots.

PLATINUM.—The market is rather firmer, and prices are inclined to be higher. Hard is held at $36 per ounce, and ordinary at $30.50. Scrap is worth about $25.

OLD METALS.—There is practically no change in the quotations for old metals, the market for all copper and brass scrap is a shade easier, in sympathy with an easier copper market, while metals hold steady. Business is very dull, and it is a very difficult matter nowadays to make any kind of a penny.

THE MARCH MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	13.85	13.50	13.75
Electrolytic	13.65	13.25	13.45
Casting	13.50	13.15	13.35
TIN	33.60	31.70	32.50
LEAD	4.70	4.50	4.50
SPELTER	5.85	5.65	5.75
ANTIMONY (Hallett's)	8.50	8.40	8.45
SILVER	.52½	.50¼	51.45

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909.—Average for year, 13.416. 1910.—Jan. 13⅞. Feb. 13⅞. Mar. 13¾.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY. for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, April 11, 1910

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	13.50
Electrolytic, carload lots	13.25
Casting, carload lots	13.15
TIN—Duty Free.	
Straits of Malacca, carload lots	32.75
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2¾c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1¾c. per lb. Sheets, 1⅝c. per lb.	
Western carload lots	5.65
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	23.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.50
Hallett's, cask lots	8.25
Other cask lots	7.25
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem	$2.00
BISMUTH—Duty free	1.80
CADMIUM—Duty free	.75
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.52½
PLATINUM—Duty free	29.40
QUICKSILVER—Duty 7c. per lb. Price per pound	68c. to 72c.

OLD METALS.

Dealers' Buying prices. Cents per lb.		Dealers' Selling prices. Cents per lb.
12.00 to 12.25	Heavy Cut Copper	13.00 to 13.25
11.25 to 11.50	Copper Wire	12.25 to 12.50
10.25 to 10.50	Light Copper	11.25 to 11.50
10.50 to 10.75	Heavy Mach. Comp.	11.75 to 12.00
8.25 to 8.50	Heavy Brass	9.25 to 9.50
6.25 to 6.50	Light Brass	7.50 to 7.75
7.25 to 7.50	No. 1 Yellow Brass Turnings	8.25 to 8.50
9.00 to 9.25	No. 1 Comp. Turnings	10.00 to 10.25
4.00 to 4.10	Heavy Lead	—— to 4.25
4.00 to 4.15	Zinc Scrap	—— to 4.50
5.00 to 5.50	Scrap Aluminum, turnings	5.00 to 5.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
19.50 to 20.00	No. 1 Pewter	23.00 to 24.00
20.00 to 25.00	Old Nickel	22.00 to 27.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%....according to quantity	28 to 35
Silicon Copper, 30% guaranteed. " "	38
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	9 to 10
Brass Ingot, Red " "	12 to 13
Bronze Ingot " "	11 to 12
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 19 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7½ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7½ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 1⅝c. per lb.	
Carload lots, standard sizes and gauges, at mill	7.75 less 8%
Casks	8.25
Open casks	8.75

Metal Prices, April 11, 1910

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect November 22, 1909, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.15⅝	$0.17⅝
Wire	.14¼	.16½	.18
Rod	.14¼	.16½	.19
Brazed tubing	.19⅝	—	.21½
Open seam tubing	.17⅝	—	.19½
Angles and channels, plain	.17⅝	—	.19½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15½	$0.16⅝	$0.18⅝
Wire	.15¼	.17½	.19
Rod	.15¼	.17½	.20
Brazed tubing	.20⅝	—	.22½
Open seam tubing	.18⅝	—	.20½
Angles and channels, plain	.18⅝	—	.20½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15.25 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c.	per lb. base.
100 lbs. to 300 lbs. in one order	19c.	" " "
Less than 100 lbs. in one order	20½c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ'S METAL AND TOBIN BRONZE.

Muntz's or Yellow Metal Sheathing (14" x 48")	15c.	net base
" " " Rectangular sheets other than Sheathing	17c.	" " "
" " " Rod	15c.	" " "
Tobin Bronze Rod	16c.	" " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough 23¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than.....	3in.	6in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.
	and including.....	12in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.	40in.
		in coils.								
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	69	72	77
" 31		43	47	55	58	63	71	74	77	83
" 32		45	49	57	61	69	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 3c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	12	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	37
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98.	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to No. 19,	B. & S.	Gauge, inclusive	$0.60
6 "	" 19,	"	"	.70
9 "	" 19,	"	"	.85
12 "	" 19,	"	"	1.00
15 "	" 19,	"	"	1.15
16 "	" 19,	"	"	1.30
18 "	" 19,	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3c. above the price of bullion.

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METAL ROLLING MILLS.

INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS.

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INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS.

A. H. Wells & Co.
WATERBURY, CONN.
MANUFACTURERS OF
SEAMLESS..... NICKEL SILVER, BRASS, COPPER, BRONZE AND PURE COPPER **TUBING**
TUBING FOR ELECTRICAL PURPOSES
Odd and Special Shapes, and Small Tubing, a Specialty
—ALSO THE—
Bourdon Steam Gauge Springs
All sizes from 8 to 36, B. & S. Gauge.

Wm. F. Renziehausen Co.
Rollers of Silver Anodes and Sterling Silver
ALSO DEALERS IN
FINE GOLD AND SILVER
43-47 Oliver St., Newark, N.J.
Long Distance Phone 3759 R.

LINTON & CO.
95 PINE STREET PROVIDENCE, R. I.
MANUFACTURERS OF
SEAMLESS BRASS . . **TUBING**
In Small Sizes
GOLD SOLDER, sheet or wire.
SILVER SOLDER, sheet or wire.
SHEET BRASS SOLDER

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FOR
SALE
—
SEND FOR RATES

THE PILLING BRASS CO.
WATERBURY, CONN.
Brass and German Silver
6 in. and narrower
.005 and thinner
PLATERS' METAL A SPECIALTY

Established 1859. Telephone connection.
JOHN TOOTHILL
BRITANNIA METAL. ANTIMONIAL LEAD.
SHEET BLOCK TIN
CASTING, ROLLING AND REFINING.
66 Pitt Street, New York City
ROCHELLE PARK, N. J.

SEAMLESS STEEL TUBING
From 4 in. Diameter to 1-64 in.
Finished Bright, Smooth and Accurate to 1-1000 In. Inside and Out
Tool Steel Tubing. Soft Steel Tubing. Also Small Brass, Copper and Aluminum Tubing.
ELLWOOD IVINS TUBE WORKS
Oak Lane Station, Philadelphia, Pa.

ROLLED FIRELESS STERLING SILVER
SILVER SOLDERS, ANODE SILVER and SILVER WIRE
For further information address
JOHN J. JACKSON CO.
91 Mechanic St. NEWARK, N. J.

HARD LEAD IN SHEETS
SHEET BLOCK TIN
Ask About BRITANNIA METAL CASTING, ROLLING and REFINING FOR THE TRADE.
STANDARD ROLLING MILLS
363 HUDSON AVENUE, BROOKLYN, N. Y.

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MANUFACTURERS OF PLATED SHEET METALS

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NATIONAL SHEET METAL CO.
Manufacturers of
PLATED SHEET METALS
FANCY ROLLED METALS
Nickelzinc, Brasszinc, Copperzinc, Bronzezinc, Nickeltin, Brasstin, Coppertin, Bronzetin Sheet Zinc, polished and unpolished, for stamping.
Large Saving to Manufacturers Last Year's Sales 1,000,000 lbs.
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Send for Rates

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BUYERS AND SELLERS OF NEW AND OLD METALS.

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Our Specialties

Heavy Copper and Copper Wire Cut in Crucible Shape.

Number One Red Brass Scrap.

Heavy Yellow Brass Scrap.

The CRESCENT

Phosphorized Metal Co.

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Manufacturers of High Grade PHOSPHOR TIN, PHOSPHOR BRONZE, PHOSPHOR COPPER, Containing up to 15% Phosphorus. MANGANESE COPPER.

Also Dealers in PHOSPHORUS. Lowest Market Prices.

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Manufacturers of

Solder, Type Metals, Babbitt Metals and White Metal Alloys

Smelters of Drosses of All Kinds — Dealers in New and Old Metals

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Pittsburg Smelting & Refining Co.

Dealers in

Brass Foundry Tailings, Emery Grindings, Magnetic Separator Tailings, Copper Scales, Brass Skimmings, Zinc Oxide, Sal Ammoniac Skimmings, Etc.

Send us Samples of what you have to Sell

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M. M. GRADE

Has the best wearing qualities, with the strength and tenacity of phosphor bronze. We claim SUPERIORITY for our "M. M. GRADE" over all other Bearing Metals on the market. We want you to convince yourself by testing and will be pleased to send a sample on request. Send for New Catalog "S."

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Skimmings, Grindings, Buffings, Sweepings **BRASS** Skimmings, Grindings, Buffings, Sweepings

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FOR SALE

Aluminum, Antimony, Antimonial Lead, Tin, Cadmium

WANTED

Zinc Dross, Zinc Ashes, Flux Skimmings

MAGNESIUM METAL

Improves the Strength of

Copper, Brass, Bronze, Aluminum, Nickel, Zinc Mixtures

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379-407 W. ONTARIO STREET, CHICAGO, ILL.

New and Old Metals

of every description bought and sold. We also carry a complete line of foundry supplies.

WE WILL EXHIBIT AT THE FOUNDRYMENS' CONVENTION AT DETROIT, JUNE 6th TO 11th, 1910.

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Office: 399-401 W. Ontario Street
Works: 434 W. Lake Street

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INGOT BRASS

Specialties: Phosphor Bronze and Brass Ingot manufactured according to specifications. We buy: Brass Borings and Turnings, Brass Grindings, Brass Foundry Ashes, Residues of all kinds

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Chemical Department

EAST ST. LOUIS, ILLS.

Manufacturers of Soldering Flux, Commercial Salts, and Chloride of Zinc in Fused, Granulated and Liquid form.

The Granulated Chloride of Zinc is indispensable, as a flux, to Brass, Copper and Aluminum Founders.

Put up in 50 and 100 lbs. iron packages.

Price 10 cents per pound delivered in the United States.

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Full value paid for any material containing Gold, Silver and Platinum

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Consumers of Skimmings, Grindings, Drosses, Filings and all kinds of Scrap Metals. Also Brass Foundry Ashes.

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(Phosphor Tin Improved)

Prevents the formation of Pores, Blow-holes or Cold-shuts in Castings.

Also prevents excessive shrinkage.

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BRASS INGOT

WHIPPLE & CHOATE, BRIDGEPORT, CONN.

For Advertisement of

U. S. REDUCTION CO.

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THE LARGEST EXCLUSIVELY ALUMINUM FOUNDRY IN THE UNITED STATES.

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